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Appendicies

RUGGLES CENTER

Final Environmental Impact Report
EOEA No. 6133

Appendices

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Prepared for:

METROPOLITAN/COLUMBIA PLAZA VENTURE
200 STATE STREET - 12TH FLOOR
BOSTON, MASSACHUSETTS 02109

Prepared By:

KRAMER ASSOCIATES • 80 Hovey Street • Watertown, MA 02172

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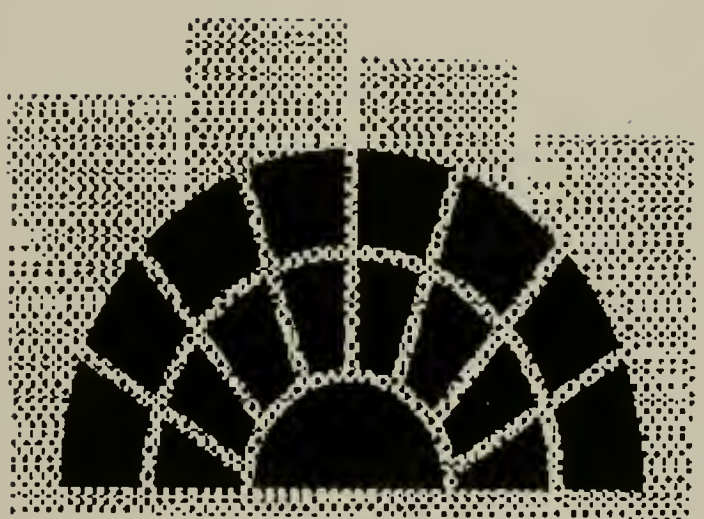


Appendix A

Wind Tunnel Simulation

WIND TUNNEL SIMULATION OF THE ATMOSPHERIC BOUNDARY LAYER

In the lowest layer of the atmosphere the wind is slowed down by the drag effect of the numerous features on the earth's surface such as vegetation, the ground roughness and man made structures. Within this atmospheric boundary layer the mean wind speed (mean implying an averaging time of about one hour) generally increase with height until the top of the layer is reached, at which point surface drag no longer plays a role. The height of the boundary layer is variable but, at least in strong winds, the best estimate is that it is about 600m or 2000 ft. (References 1 and 2).

In wind tunnel tests, it is important to simulate the mean wind speed profile, the wind's turbulence intensity and the length scale of turbulence within the atmospheric boundary layer. Figure 1 shows the boundary layer wind tunnel at the Guelph laboratory of Rowan Williams Davies & Irwin Inc. The model to be tested is mounted near the centre of the 2.4m (8 ft.) diameter turntable, 13m (42 ft.) downwind of the entrance to the working section. All major features and structures within the radius covered by the turntable are modelled in detail thereby assuring their effect on the wind flows around the site being studied is accurately simulated. Upstream of the turntable the terrain roughness is modelled by generalized roughness distributed over the working section's floor. In addition, specially designed turbulence generators are installed at the start of the working section. By varying the floor roughness and turbulence generators the effects of various types of terrain roughness upwind of the turntable can be reproduced at model scale. A detailed explanation of these techniques is given in Reference 3.

In strong winds, the mean speed profile in the atmospheric boundary layer is found to be well represented by the power law expression:

$$U = U_g \, (Z/Z_g)^{\alpha}$$

where

U = mean wind speed
U_g = gradient wind speed (value of U at the top of the boundary layer)
Z = height above ground
Z_g = depth of boundary layer
α = constant.

The exponent, α , varies with terrain roughness. The following are representative values:

Type of Terrain	α
Open country with some vegetation	0.14
Suburban areas	0.25
Heavily built city cores	0.33

Figure 2 shows a wind speed profile generated in the boundary layer wind tunnel and compares them with the above power law expression. The wind tunnel speed profile can be seen to follow the power law relation well for each type of the boundary layer.

The wind turbulence intensity may be quantified by defining it as the ratio u'/U where u' = root-mean-square of the velocity fluctuations in the direction of the mean wind velocity. The turbulence intensity increases as the terrain roughness increases and is generally greater near to the ground. Figure 3 shows the measured turbulence intensities for each of the simulated atmospheric boundary layers described above. Some full scale data are included for comparison (obtained form Ref. 4).

The integral scale of the turbulence, which can be thought of as an average size of turbulence eddy, is on the order of 150m (500 ft.) high up on the planetary boundary layer but decreases significantly near to the ground. For a 1:400 scale model of the appropriate integral scale of the wind tunnel turbulence should therefore be about 0.365m (1.25 ft.) in

the upper part of the boundary layer. One way of measuring the integral scale is to measure the power spectrum, S, of longitudinal turbulence and comparing it in non-dimensional form with the theoretical von Karman spectrum,

$$\frac{nS}{u'^2} = \frac{4\,(nL/U)}{\{1 + 70.78\,(nL/U)^2\}^{5/6}}$$

which has been found to agree well with full scale spectra obtained in high winds. The measured spectrum is plotted against nL/U, the value of L being adjusted until a best fit to the von Karman expression is obtained. This value of L is then the integral scale of the turbulence in the wind tunnel. Figure 4 shows a typical comparison between the measured spectrum in the wind tunnel and the von Karman spectrum, and indicates the equivalent full scale value of L obtained. It corresponds well to typical full scale values and the shape of the wind tunnel turbulence spectrum closely follows the von Karman curve.

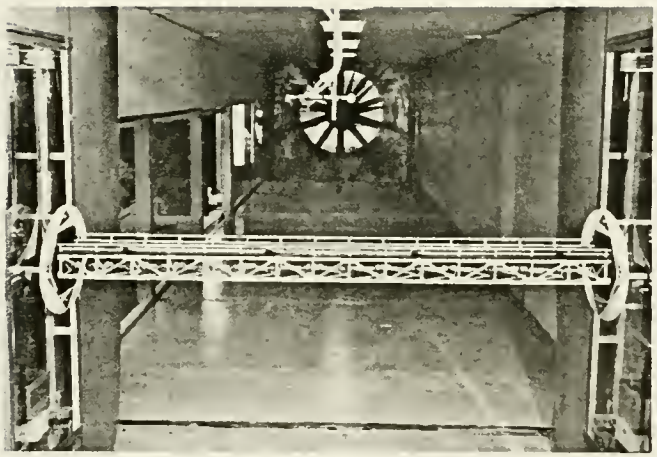
References

1. Counihan, J. "Adiabatic Atmospheric Boundary Layer: A Review of Data from the Period 1880-1972", Atmospheric Environment, V.9, No. 10, pp. 871-905, 1975.

2. Snyder, W.H. "Guideline for Fluid Modelling of Atmospheric Diffusion", U.S. Environmental Protection Agency, Report 600/8-81-009, 1981.

3. Irwin, P.A. "Design and Use of Spires for Natural Wind Simulation", National Research Council of Canada, N.A.E. Report LTR-LA-233, 1979.

4. Engineering Sciences "Characteristics of Atmospheric Turbulence Data Unit Near the Ground: Part III, Variations in Space and Time for Strong Winds", Engineering Sciences Data Item Number 750001, London, England, 1975.



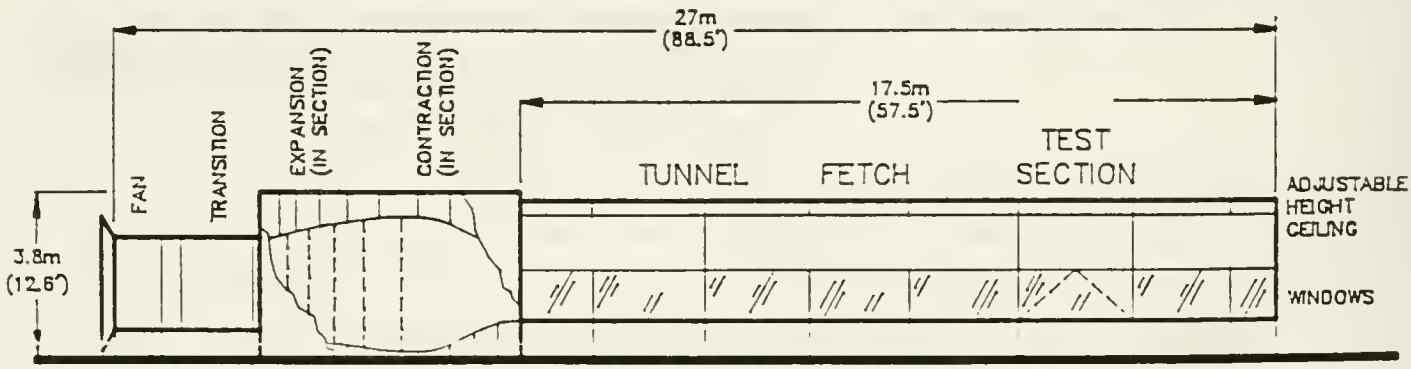
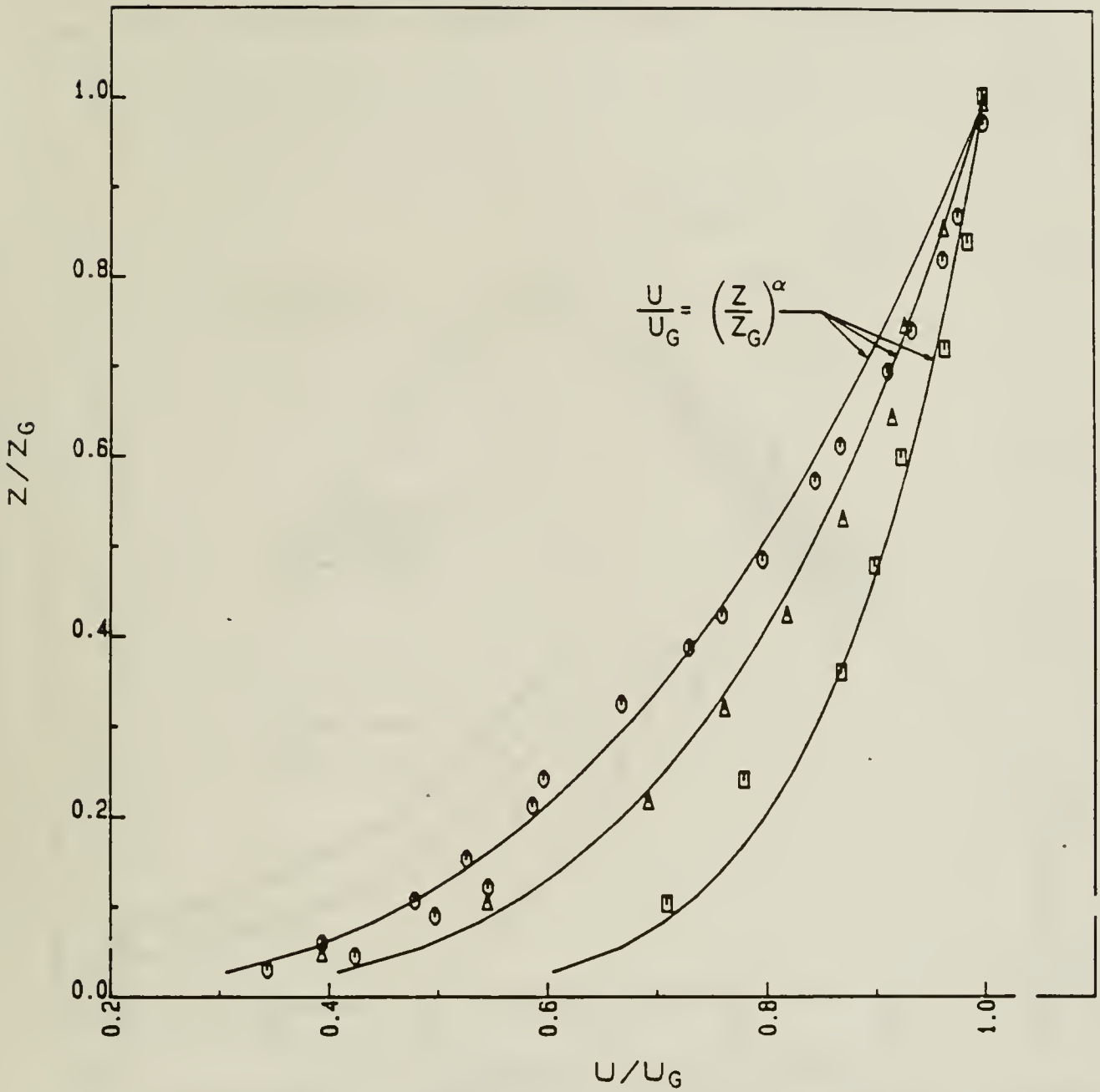


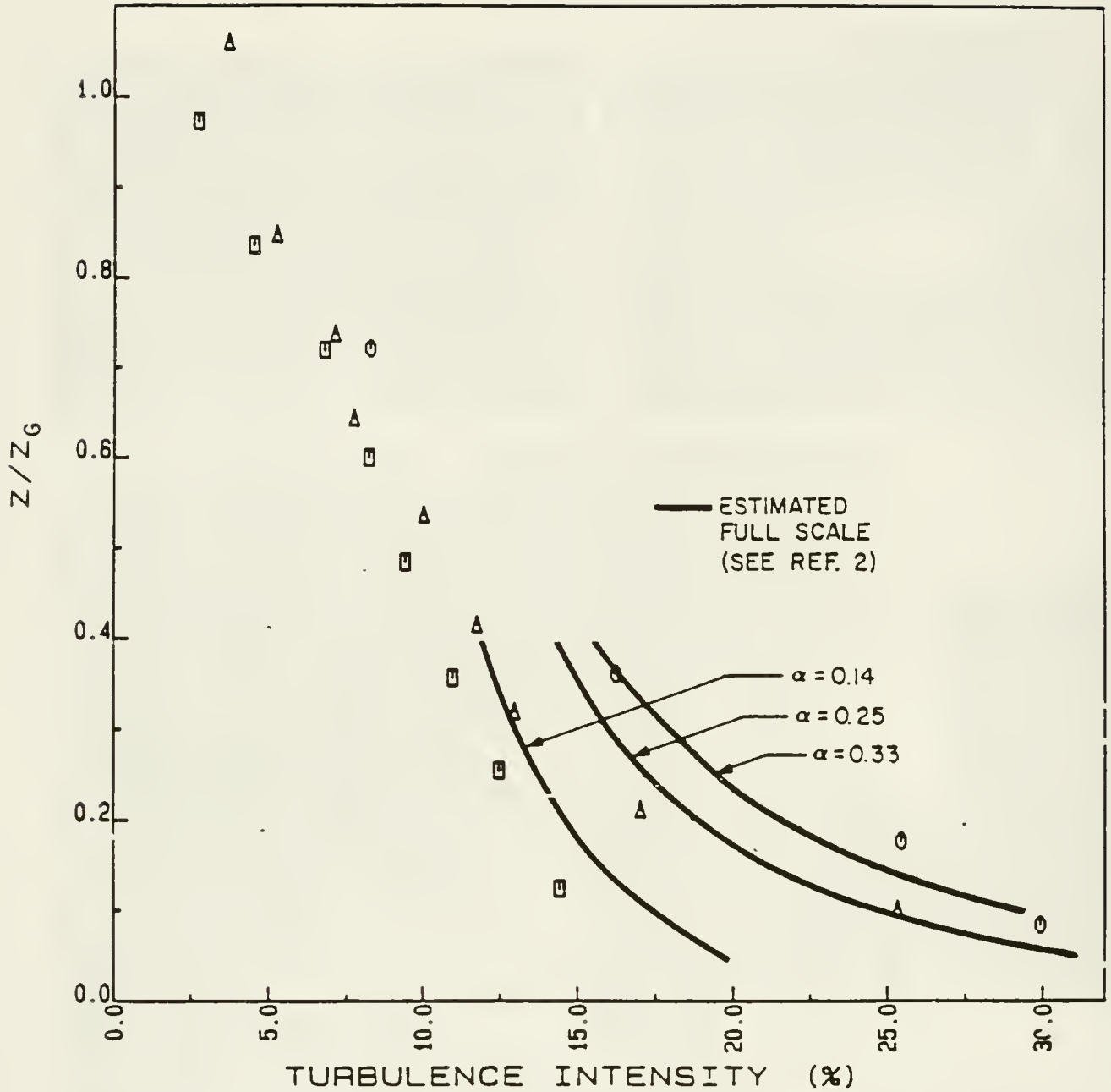
FIGURE A–1

GUELPH BOUNDARY LAYER WIND TUNNEL FACILITY



SYMBOL	α	Z_G
○	.33	450m (1500ft)
△	.25	360m (1200ft)
□	.14	275m (900ft)

FIGURE A-2
SIMULATED MEAN WIND SPEED PROFILE



WIND SIMULATION DATA

SYMBOL	α	Z_G
⊙	.33	450m (1500ft)
△	.25	360m (1200ft)
□	.14	275m (900ft)

FIGURE A-3

SIMULATED AND FULL SCALE LONGITUDINAL TURBULENCE INTENSITY PROFILES

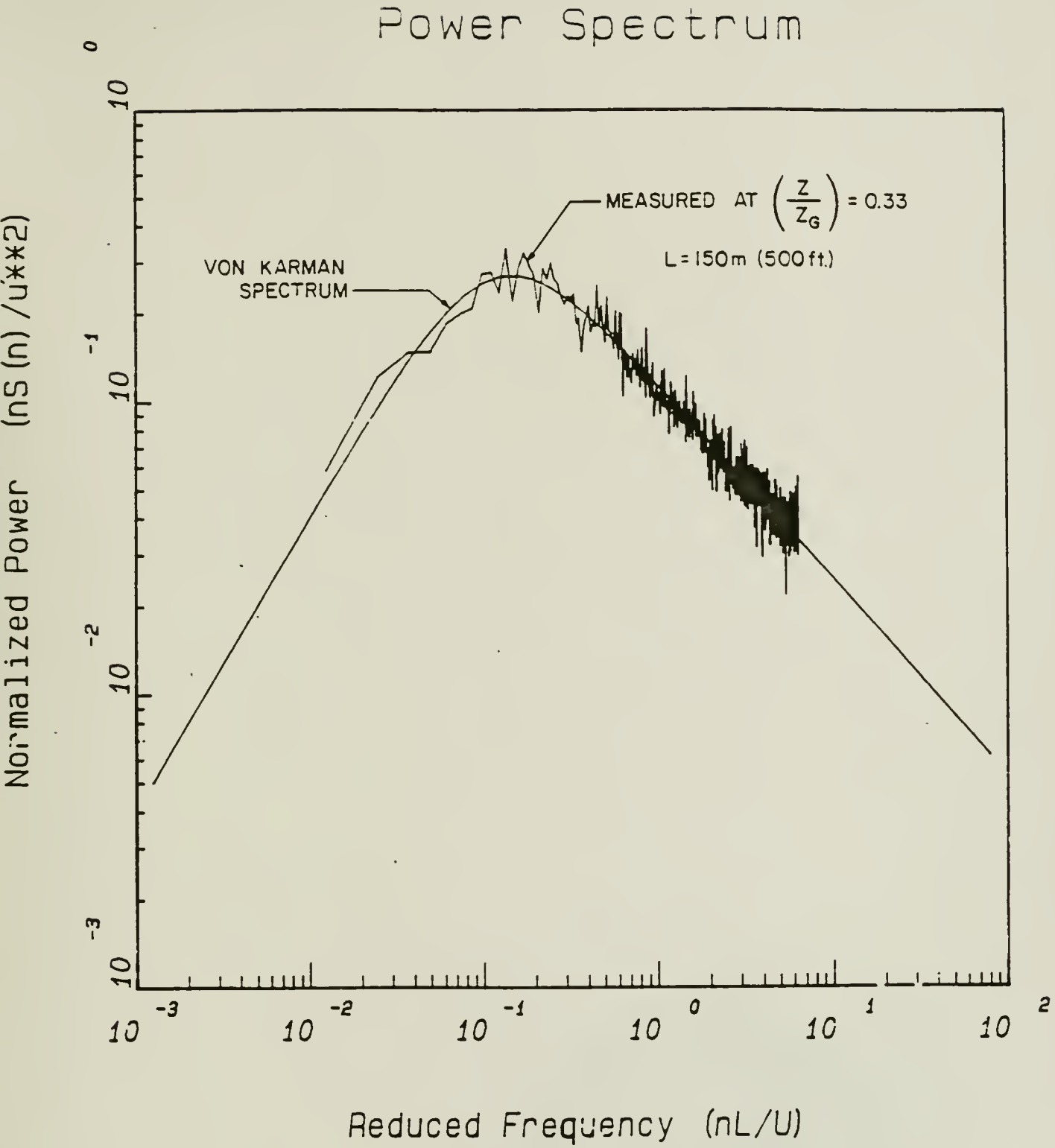
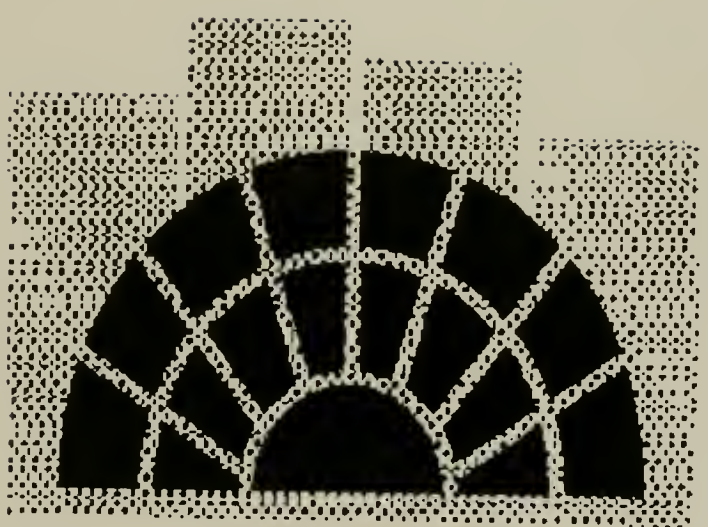


FIGURE A–4

TYPICAL SPECTRUM OF THE LONGITUDINAL WIND VELOCITY COMPONENT MEASURED OVER THE TEST SITE FOR $\alpha = 0.33$



Appendix B

Water Flume Simulator

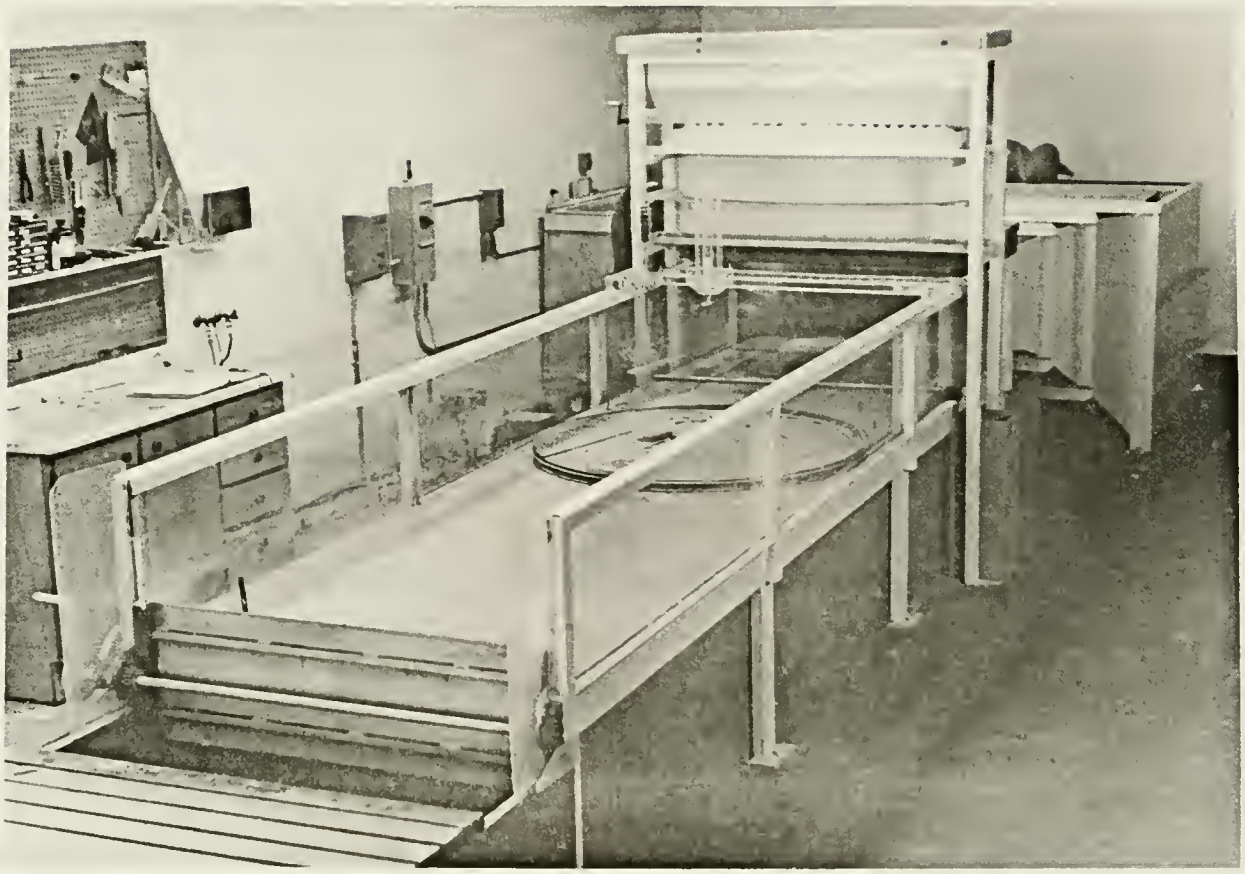
WATER FLUME WIND AND SNOW SIMULATOR

The water flume consists of a 1.2m wide, 138cm deep open channel through which water flows. A scaled model of the area to be studied, for either the effects of wind or drifting snow, is placed on the floor of the water channel and the water is allowed to flow over the model. The water flow can then be adjusted to simulate the atmospheric wind flow around the scaled model.

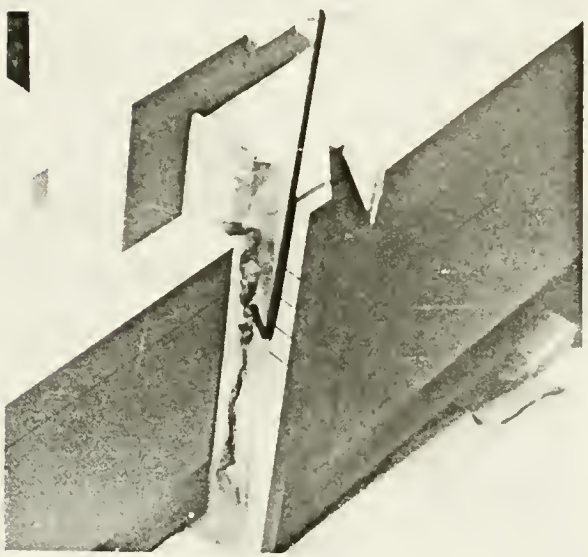
The water flow around the model can be easily visualized by introducing a coloured dye into the water. The good flow visualization properties of the water flume make it an ideal design tool. Personnel directly involved with the project design are able to clearly see the wind flows around their proposed project by participating in the study at our laboratory. This makes for an easy understanding of the wind and drifting snow problems. Also, as the models are easily accessible during the tests, the effects of rearranging the components of a project or the adding of control devices can be clearly observed and optimum solutions readily determined.

The method used to study the effects of drifting snow is to introduce a fine white silica sand into the water to represent the snow and the moving water carries and deposits snow. The wind speed at any point within the study area is determined by measuring the water speed at the point of interest on the model.

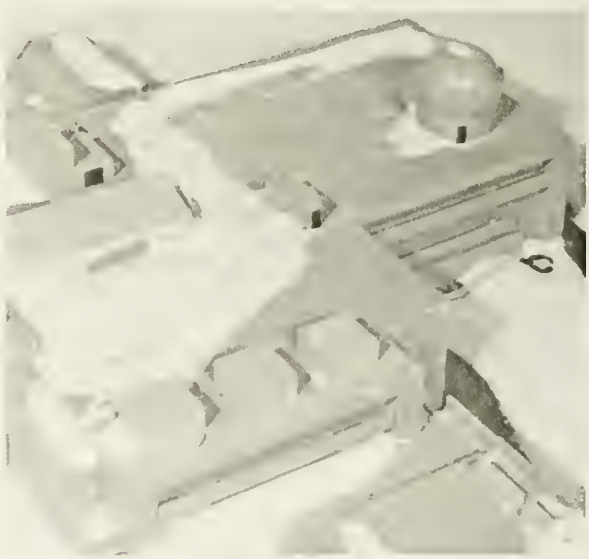
In addition to the study of wind and drifting snow, the water flume technique is suitable for the study of other windblown particles such as drifting sand, coal dust, etc.



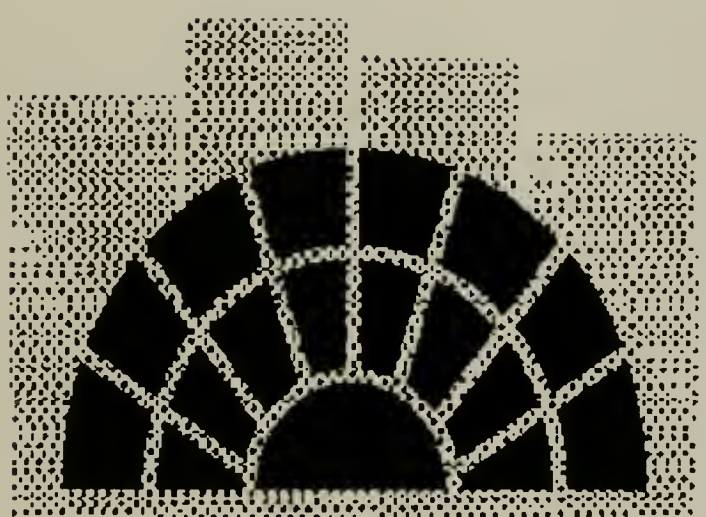
WATER FLUME - WIND AND SNOW SIMULATOR



SIMULATED WIND FLOW VISUALIZED WITH DYE



TYPICAL SIMULATED SNOWDRIFT PATTERNS



Appendix C

Pedestrian Level Wind Test Data

PEDESTRIAN LEVEL WIND TEST DATA

The wind speed ratios presented in this appendix are of the wind speed at each sensor location (5 feet above grade) to the mean wind speed which would typically occur at 5 feet above grade in an exposed area (e.g. baseball field) in a suburban area. To better understand this, consider the wind speed ratios presented for Location 13 in Tables C-5, C-25 and C-45. The data on the left hand side of the tables present information pertaining to the existing site conditions (test configuration A). Information presented on the middle columns of the tables addresses the site conditions with the proposed Ruggles Center in place (test configuration B). The column of data on the right hand side of the tables presents the information for the proposed Ruggles Center with Remedial Devices (test configuration C). The conditions at Location 13 (Table C-5, Proposed Ruggles Center with remedial devices) indicates that a mean wind speed ratio of 0.9 occurs for a northeast wind direction (wind blowing from the northeast). This ratio indicates that, for a northeast wind direction, the wind speed would be 0.9 times or 10% less than the wind speed in an exposed location in the city, 5 feet above grade. Hence, a 10 mph mean wind speed would be reduced to 9 mph at Location 13 for a northeast wind direction.

The second wind speed ratio given in the tables for the Proposed Ruggles Center with Remedial Devices presents the effective gust speed ratio recorded during the wind tunnel tests. This ratio can be interpreted in a similar manner as described above for mean wind speed ratios (i.e. effective gusts of 1.6 times the city mean wind speed will occur for northeast winds).

The next two columns of values for each location present a weighting factor for the spring (SPR) and for the summer (SUM). These factors are a measure of how each wind direction affects the overall comfort level at each location. The weighting factor is derived from an analysis of the wind tunnel test data (effective gust wind speed ratios) and the wind records obtained from the local weather station (i.e. Logan International Airport). As a result of this analysis, the weighting factor is dependent upon each of the following:

i) the gust wind speed ratio measured at the sensor;
ii) the frequency of occurrence of the wind direction being examined; and
iii) the strength of the wind for the same wind direction examined.

The weighting factors are expressed as a percentage. For instance, the spring weighting factor for our example, Location 13, and a northeast wind direction, is 5%. This indicates that 5% of the time, when the monthly effective gust wind speeds are exceeded at Location 13, the wind will occur from this direction. The weighting factor allows one to look at each sensor location and immediately determine which wind direction(s) has the greatest impact on the resultant wind comfort level. For example, the most important wind direction for Location 13 during the spring is SSW. Since the weighting factors are based on a meteorological data analysis, they will vary from season to season for a given test location and direction (see Table C-25 for the fall and winter data and Table C-45 for the annual data for Location 13). This is evident in our example as the northeast wind direction for Location 13 during the spring has a weighting factor of 5% (6th highest) and during the summer the weighting factor is 3%, which is the 5th highest during this season.

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 1					LOCATION 1				LOCATION 1			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.5	2.1	6	6	NNE	1.8	2.3	2	3	NNE	0.3	0.6	0	0
NE	1.4	2.0	16	9	NE	0.9	1.4	0	0	NE	0.2	0.6	0	0
ENE	1.7	2.3	16	4	ENE	1.1	1.7	0	0	ENE	0.1	0.7	0	0
E	1.4	2.0	4	2	E	0.8	1.4	0	0	E	0.1	0.6	0	0
ESE	1.2	1.8	0	0	ESE	0.8	1.3	0	0	ESE	0.1	0.2	0	0
SE	0.9	1.5	0	0	SE	0.9	1.5	0	0	SE	0.5	1.1	0	0
SSE	1.2	1.8	0	0	SSE	1.3	2.0	0	0	SSE	1.0	1.4	0	0
S	1.6	2.2	4	3	S	2.2	2.9	5	4	S	1.4	1.8	2	1
SSW	1.7	2.2	5	13	SSW	2.4	3.1	11	24	SSW	1.7	2.2	12	17
SW	1.8	2.3	15	41	SW	2.1	2.7	6	22	SW	1.8	2.4	36	54
WSW	1.3	2.0	5	9	WSW	1.6	2.4	3	6	WSW	1.5	2.1	18	21
W	1.1	1.9	11	3	W	1.3	2.3	9	2	W	1.3	1.7	14	2
WNW	1.3	1.8	12	5	WNW	1.5	2.2	6	3	WNW	1.3	1.8	21	5
NW	1.1	1.6	1	0	NW	2.0	2.7	17	8	NW	0.7	1.3	0	0
NNW	1.2	1.8	0	0	NNW	2.5	3.3	31	21	NNW	0.1	0.6	0	0
N	1.5	2.1	4	3	N	2.3	3.1	11	7	N	0.5	0.8	0	0
LOCATION 2					LOCATION 2					LOCATION 2				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.5	2.0	2	3	NNE	0.6	0.9	0	0	NNE	0.4	0.7	0	0
NE	1.6	2.2	16	10	NE	0.3	0.6	0	0	NE	0.1	0.5	0	0
ENE	1.8	2.3	10	2	ENE	0.4	0.8	0	0	ENE	0.1	0.7	0	0
E	1.4	2.0	2	2	E	0.5	0.8	0	0	E	0.1	1.2	2	1
ESE	1.0	1.6	0	0	ESE	0.7	1.1	0	0	ESE	0.3	0.6	0	0
SE	0.8	1.3	0	0	SE	1.1	1.7	0	2	SE	0.1	0.6	0	0
SSE	1.2	1.8	0	0	SSE	1.1	1.8	0	1	SSE	0.5	0.9	0	0
S	1.6	2.2	2	2	S	1.2	1.9	1	3	S	0.6	1.0	0	0
SSW	1.8	2.3	3	13	SSW	0.9	1.5	0	2	SSW	0.8	1.0	0	0
SW	1.9	2.4	8	32	SW	0.1	1.0	0	0	SW	0.8	1.5	9	28
WSW	1.3	1.9	1	4	WSW	0.2	1.2	0	0	WSW	0.9	1.7	28	47
W	1.5	2.2	25	11	W	0.4	1.4	0	0	W	0.8	1.5	47	19
WNW	1.6	2.2	26	14	WNW	1.7	2.4	94	82	WNW	0.1	1.3	16	6
NW	1.3	1.8	1	1	NW	1.1	1.8	5	10	NW	0.1	0.7	0	0
NNW	1.4	2.0	0	1	NNW	0.9	1.4	0	0	NNW	0.4	0.9	0	0
N	1.7	2.3	4	4	N	0.5	1.0	0	0	N	0.4	0.8	0	0
LOCATION 3					LOCATION 3					LOCATION 3				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.5	2.1	3	4	NNE	1.0	1.6	0	0	NNE	0.2	0.7	0	0
NE	1.7	2.2	15	10	NE	0.2	0.8	0	0	NE	0.2	0.6	0	0
ENE	1.4	2.0	3	1	ENE	0.5	1.1	0	0	ENE	0.1	0.6	0	0
E	1.6	2.2	5	3	E	1.3	1.9	0	0	E	0.1	0.6	0	0
ESE	0.8	1.4	0	0	ESE	1.5	2.3	0	0	ESE	0.4	0.9	0	0
SE	0.7	1.2	0	0	SE	1.6	2.4	0	1	SE	0.1	1.0	0	0
SSE	1.1	1.7	0	0	SSE	1.1	1.8	0	0	SSE	0.3	1.2	0	0
S	1.5	2.1	1	1	S	1.0	1.8	0	0	S	0.7	1.3	0	0
SSW	1.9	2.4	4	15	SSW	0.9	1.7	0	0	SSW	0.9	1.3	0	0
SW	1.9	2.4	7	29	SW	1.8	2.5	1	17	SW	1.3	2.0	7	23
WSW	1.3	2.0	2	5	WSW	1.7	2.6	5	17	WSW	1.5	2.4	29	48
W	1.6	2.4	33	15	W	2.0	2.9	38	26	W	1.4	2.3	67	31
WNW	1.6	2.2	22	11	WNW	2.3	3.0	56	38	WNW	0.5	0.9	0	0
NW	1.2	1.7	0	0	NW	1.3	2.1	0	1	NW	0.1	0.7	0	0
NNW	1.5	2.1	1	2	NNW	1.0	1.5	0	0	NNW	0.7	1.1	0	0
N	1.7	2.3	3	3	N	1.0	1.5	0	0	N	0.3	0.7	0	0

TABLE C-1
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 4					LOCATION 4				LOCATION 4			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.6	2.3	12	10	NNE	0.9	1.7	1	2	NNE	0.7	1.4	0	1
NE	0.8	1.4	0	1	NE	0.7	1.3	0	0	NE	0.6	1.2	0	1
ENE	0.6	1.1	0	0	ENE	0.6	1.2	0	0	ENE	0.7	1.4	0	0
E	0.8	1.2	0	0	E	0.9	1.6	1	1	E	1.0	1.6	1	1
ESE	0.9	1.3	0	0	ESE	1.2	1.8	0	0	ESE	1.3	1.8	0	0
SE	0.8	1.3	0	0	SE	1.1	1.6	0	0	SE	1.2	1.6	0	1
SSE	1.2	1.9	0	0	SSE	0.7	1.4	0	0	SSE	1.0	1.6	0	0
S	1.7	2.3	5	5	S	1.3	1.9	1	1	S	1.1	1.7	0	0
SSW	2.0	2.5	17	31	SSW	1.6	2.0	2	13	SSW	1.4	1.9	1	8
SW	1.7	2.2	7	23	SW	1.4	1.9	1	16	SW	1.3	1.8	1	13
WSW	1.2	1.7	1	1	WSW	1.0	1.6	1	3	WSW	1.2	1.7	1	6
W	1.1	1.7	3	0	W	1.3	2.1	31	21	W	1.4	2.1	28	20
WNW	1.4	2.0	17	6	WNW	1.6	2.3	59	39	WNW	1.7	2.3	63	44
NW	1.5	2.0	9	4	NW	1.2	1.8	2	3	NW	1.3	1.8	4	5
NNW	2.0	2.5	21	14	NNW	1.1	1.7	0	1	NNW	1.2	1.7	0	1
N	1.8	2.4	9	6	N	1.0	1.7	0	1	N	0.9	1.5	0	0
LOCATION 5					LOCATION 5					LOCATION 5				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.5	2.0	4	6	NNE	1.6	2.2	4	7	NNE	1.0	1.4	3	3
NE	1.4	2.0	13	10	NE	1.0	1.5	0	1	NE	0.8	1.2	2	2
ENE	1.8	2.4	16	5	ENE	0.9	1.6	0	0	ENE	0.6	0.9	0	0
E	1.4	1.9	2	2	E	0.9	1.6	0	0	E	0.5	0.9	0	0
ESE	1.3	1.9	0	0	ESE	0.9	1.5	0	0	ESE	0.1	0.2	0	0
SE	1.0	1.5	0	0	SE	1.2	1.9	0	1	SE	0.8	1.5	0	2
SSE	1.4	1.9	0	1	SSE	1.4	2.1	0	1	SSE	1.1	1.8	1	2
S	1.6	2.1	2	2	S	1.8	2.3	2	3	S	1.0	1.7	8	6
SSW	1.6	2.1	2	10	SSW	1.5	2.0	0	4	SSW	1.0	1.6	5	11
SW	1.7	2.1	4	25	SW	1.3	1.8	0	2	SW	1.0	1.5	4	16
WSW	1.2	1.9	2	6	WSW	0.8	1.7	0	1	WSW	1.2	1.8	24	36
W	1.1	1.9	11	5	W	0.6	1.5	0	0	W	1.0	1.3	9	2
WNW	1.6	2.2	32	19	WNW	1.3	1.8	2	2	WNW	1.1	1.4	18	6
NW	1.5	2.1	11	8	NW	1.7	2.4	22	18	NW	1.0	1.5	11	4
NNW	0.9	1.4	0	0	NNW	2.3	3.1	50	43	NNW	1.2	1.6	7	5
N	1.1	1.6	0	0	N	2.2	2.9	19	18	N	1.1	1.6	5	3
LOCATION 6					LOCATION 6					LOCATION 6				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.5	2.1	3	5	NNE	1.0	1.8	0	1	NNE	1.1	1.7	1	3
NE	1.6	2.1	12	9	NE	0.8	1.2	0	0	NE	0.6	1.3	0	0
ENE	1.7	2.2	6	2	ENE	0.9	1.4	0	0	ENE	0.4	1.0	0	0
E	1.5	2.0	2	2	E	0.8	1.3	0	0	E	0.4	1.1	0	0
ESE	1.0	1.6	0	0	ESE	1.0	1.9	0	0	ESE	0.6	1.6	0	0
SE	1.0	1.4	0	0	SE	1.7	2.4	0	2	SE	1.4	2.1	0	2
SSE	1.4	1.9	0	0	SSE	1.4	2.1	0	0	SSE	1.4	2.0	0	1
S	1.7	2.2	2	2	S	1.6	2.1	0	0	S	1.4	1.8	0	1
SSW	1.7	2.2	1	7	SSW	1.1	1.7	0	0	SSW	1.2	1.6	0	1
SW	1.8	2.3	5	28	SW	0.8	1.4	0	0	SW	0.9	1.5	0	1
WSW	1.1	1.8	0	2	WSW	0.9	1.9	0	1	WSW	0.9	2.0	3	12
W	1.5	2.3	26	14	W	0.9	1.6	0	0	W	1.1	1.9	8	4
WNW	1.8	2.4	38	23	WNW	1.6	2.1	4	4	WNW	1.3	1.9	9	6
NW	1.4	2.0	3	3	NW	2.1	2.9	40	34	NW	1.5	2.1	12	10
NNW	1.1	1.6	0	0	NNW	2.7	3.5	46	47	NNW	2.2	2.9	48	42
N	1.6	2.2	2	2	N	2.1	3.0	9	11	N	1.9	2.7	19	17

TABLE C-2
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 7					LOCATION 7				LOCATION 7			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.6	2.2	5	7	NNE	0.9	1.6	0	1	NNE	0.9	1.5	0	2
NE	1.6	2.1	12	9	NE	0.7	1.0	0	0	NE	0.4	0.8	0	0
ENE	1.3	2.1	4	1	ENE	0.8	1.3	0	0	ENE	0.8	1.6	1	0
E	1.2	1.8	1	1	E	1.4	1.9	1	1	E	1.6	2.3	13	9
ESE	1.0	1.4	0	0	ESE	1.6	2.2	1	0	ESE	2.0	2.6	18	15
SE	1.3	1.8	0	1	SE	1.4	1.8	0	1	SE	1.5	1.9	0	2
SSE	1.6	2.1	0	1	SSE	1.6	2.1	0	1	SSE	1.5	2.0	0	1
S	1.7	2.1	1	1	S	1.5	2.0	0	1	S	1.4	1.9	2	3
SSW	1.7	2.2	1	7	SSW	1.4	1.9	0	2	SSW	1.3	1.7	0	3
SW	1.8	2.3	4	25	SW	1.4	1.9	0	6	SW	1.1	1.7	0	6
WSW	1.3	2.1	3	8	WSW	1.0	1.7	0	1	WSW	0.8	1.5	0	1
W	1.6	2.3	31	16	W	1.5	2.2	13	8	W	1.2	1.8	12	7
WNW	1.4	2.2	21	12	WNW	1.6	2.4	30	23	WNW	1.3	1.9	20	16
NW	1.7	2.3	14	10	NW	1.9	2.4	20	18	NW	1.4	1.9	10	10
NNW	1.4	2.0	1	1	NNW	2.1	2.8	21	24	NNW	1.1	1.9	1	3
N	1.5	2.1	1	1	N	2.0	2.8	15	15	N	1.6	2.6	20	20
LOCATION 8					LOCATION 8					LOCATION 8				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.7	2.2	3	5	NNE	1.0	1.5	0	0	NNE	0.7	1.1	0	0
NE	1.6	2.2	10	8	NE	0.9	1.4	0	0	NE	0.7	1.2	0	0
ENE	1.1	1.7	0	0	ENE	1.5	2.2	3	1	ENE	1.4	2.0	6	2
E	1.3	2.0	1	1	E	1.8	2.4	5	5	E	1.6	2.2	7	6
ESE	0.8	1.2	0	0	ESE	2.1	2.7	5	3	ESE	1.9	2.5	7	4
SE	0.9	1.4	0	0	SE	2.0	2.8	1	6	SE	1.7	2.4	1	5
SSE	1.4	2.0	0	0	SSE	1.5	2.0	0	0	SSE	1.4	1.9	0	1
S	1.7	2.3	2	2	S	1.3	1.8	0	0	S	1.1	1.6	0	0
SSW	1.8	2.3	2	10	SSW	1.0	1.5	0	0	SSW	1.1	1.5	0	0
SW	1.8	2.3	3	22	SW	1.0	1.5	0	0	SW	1.1	1.6	0	3
WSW	1.3	2.0	1	4	WSW	1.1	1.8	0	2	WSW	1.2	1.8	1	6
W	1.7	2.4	28	16	W	1.6	2.3	15	13	W	1.5	2.2	35	28
WNW	1.7	2.4	37	22	WNW	1.9	2.6	41	35	WNW	1.6	2.1	30	24
NW	1.6	2.2	6	5	NW	1.9	2.7	31	30	NW	1.3	1.9	5	7
NNW	1.5	2.0	0	1	NNW	1.2	2.1	0	2	NNW	1.5	2.3	7	12
N	1.9	2.4	4	4	N	0.9	1.4	0	0	N	0.7	1.2	0	0
LOCATION 9					LOCATION 9					LOCATION 9				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.7	2.3	10	11	NNE	0.9	1.4	0	1	NNE	0.7	1.3	0	0
NE	0.7	1.4	0	1	NE	0.8	1.3	0	1	NE	0.7	1.3	0	0
ENE	0.6	1.1	0	0	ENE	0.6	1.2	0	0	ENE	0.6	1.2	0	0
E	0.5	1.0	0	0	E	0.8	1.4	0	0	E	0.9	1.4	0	0
ESE	0.8	1.1	0	0	ESE	0.8	1.4	0	0	ESE	0.9	1.4	0	0
SE	0.9	1.4	0	0	SE	0.7	1.3	0	0	SE	0.8	1.2	0	0
SSE	1.4	2.0	0	1	SSE	1.2	1.8	0	0	SSE	1.1	1.7	0	0
S	1.5	2.1	2	2	S	1.2	1.8	0	1	S	1.1	1.7	0	0
SSW	1.8	2.3	4	15	SSW	1.4	1.9	0	6	SSW	1.3	1.8	0	4
SW	1.5	2.0	1	13	SW	1.3	1.8	0	9	SW	1.4	1.9	1	13
WSW	1.3	1.8	1	3	WSW	1.2	1.7	1	4	WSW	1.3	1.9	2	9
W	1.5	2.1	19	9	W	1.6	2.3	35	27	W	1.7	2.3	46	35
WNW	1.5	2.2	31	18	WNW	1.8	2.4	55	41	WNW	1.6	2.3	49	35
NW	1.6	2.1	9	7	NW	1.5	2.0	7	9	NW	1.2	1.8	2	3
NNW	1.9	2.5	13	13	NNW	1.0	1.6	0	0	NNW	1.0	1.7	0	0
N	1.9	2.5	9	8	N	1.2	1.8	0	1	N	1.0	1.6	0	0

TABLE C-3
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS	PROPOSED RUGGLES CENTER	PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES

LOCATION 10

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT SPR	WEIGHT SUM
NNE	1.5	2.1	3	4
NE	1.7	2.3	18	10
ENE	1.5	2.1	5	1
E	1.6	2.2	5	3
ESE	0.8	1.4	0	0
SE	0.2	0.8	0	0
SSE	1.0	1.6	0	0
S	1.5	2.1	1	1
SSW	2.0	2.5	7	18
SW	2.0	2.5	12	37
WSW	1.4	2.0	2	5
W	1.6	2.3	32	13
WNW	1.4	2.0	12	5
NW	1.2	1.7	0	0
NNW	1.5	2.0	1	1
N	1.5	2.1	1	1

LOCATION 10

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT SPR	WEIGHT SUM
NNE	0.8	1.2	2	1
NE	0.7	1.1	2	1
ENE	0.7	0.9	0	0
E	0.9	1.3	2	1
ESE	0.6	1.1	0	0
SE	0.6	1.3	0	1
SSE	0.1	1.5	0	1
S	0.1	1.2	1	0
SSW	1.0	1.7	15	16
SW	1.2	1.9	51	62
WSW	0.9	1.7	20	20
W	0.7	1.2	6	0
WNW	0.6	1.0	1	0
NW	0.8	1.2	1	0
NNW	0.8	1.1	0	0
N	0.8	1.2	0	0

LOCATION 10

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT SPR	WEIGHT SUM
NNE	0.6	0.9	0	0
NE	0.5	0.9	1	0
ENE	0.4	0.7	0	0
E	0.2	0.6	0	0
ESE	0.1	1.3	3	0
SE	0.5	1.2	0	1
SSE	0.6	1.2	0	0
S	0.7	1.2	1	0
SSW	1.0	1.6	22	20
SW	0.9	1.7	61	66
WSW	0.6	1.4	17	14
W	0.3	0.9	1	0
WNW	0.2	0.7	0	0
NW	0.1	0.6	0	0
NNW	0.1	0.6	0	0
N	0.1	0.7	0	0

LOCATION 11

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT SPR	WEIGHT SUM
NNE	1.5	2.0	3	4
NE	1.8	2.3	22	12
ENE	1.5	2.1	4	1
E	1.6	2.2	5	3
ESE	0.7	1.3	0	0
SE	0.3	1.0	0	0
SSE	0.8	1.4	0	0
S	1.4	2.0	1	0
SSW	2.0	2.5	7	18
SW	2.0	2.5	13	38
WSW	1.4	2.1	3	7
W	1.6	2.3	29	11
WNW	1.3	1.9	9	4
NW	1.1	1.7	0	0
NNW	1.5	2.1	1	2
N	1.4	2.0	1	1

LOCATION 11

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT SPR	WEIGHT SUM
NNE	1.1	1.7	1	1
NE	1.1	1.6	1	1
ENE	2.0	2.5	21	5
E	2.0	2.6	21	8
ESE	1.9	2.7	15	4
SE	1.6	2.5	1	4
SSE	0.9	1.8	0	0
S	1.1	1.9	1	0
SSW	1.8	2.5	12	22
SW	1.6	2.6	25	51
WSW	0.9	1.9	2	3
W	1.0	1.6	1	0
WNW	0.7	1.2	0	0
NW	0.7	1.1	0	0
NNW	0.8	1.1	0	0
N	1.0	1.4	0	0

LOCATION 11

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT SPR	WEIGHT SUM
NNE	0.9	1.4	0	0
NE	1.0	1.6	1	1
ENE	2.1	2.5	24	5
E	1.9	2.5	19	7
ESE	1.9	2.6	12	2
SE	1.6	2.5	1	4
SSE	0.6	1.5	0	0
S	1.0	1.7	0	0
SSW	1.5	2.3	6	13
SW	1.8	2.7	36	65
WSW	1.0	1.9	2	3
W	0.8	1.4	0	0
WNW	0.8	1.2	0	0
NW	0.7	1.0	0	0
NNW	0.6	1.0	0	0
N	0.8	1.3	0	0

LOCATION 12

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT SPR	WEIGHT SUM
NNE	1.4	1.9	2	3
NE	1.6	2.2	16	9
ENE	1.7	2.2	7	1
E	1.5	2.1	3	2
ESE	1.3	1.8	0	0
SE	0.7	1.3	0	0
SSE	0.8	1.4	0	0
S	0.8	1.5	0	0
SSW	1.7	2.2	2	9
SW	2.0	2.5	12	39
WSW	1.5	2.1	5	11
W	1.7	2.3	37	17
WNW	1.5	2.0	13	6
NW	1.2	1.8	1	1
NNW	1.5	2.0	1	1
N	1.3	1.9	0	0

LOCATION 12

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT SPR	WEIGHT SUM
NNE	0.8	1.4	0	0
NE	0.7	1.3	0	0
ENE	1.8	2.3	24	7
E	1.7	2.4	22	10
ESE	1.7	2.4	10	3
SE	1.6	2.3	1	4
SSE	1.1	2.0	0	1
S	1.3	2.1	4	4
SSW	1.7	2.2	10	23
SW	1.5	2.0	7	26
WSW	1.3	2.0	9	18
W	1.1	1.8	11	3
WNW	0.8	1.3	0	0
NW	0.6	1.0	0	0
NNW	0.7	1.0	0	0
N	0.7	1.1	0	0

LOCATION 12

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT SPR	WEIGHT SUM
NNE	0.5	1.0	0	0
NE	0.7	1.4	1	1
ENE	2.1	2.6	35	13
E	1.7	2.4	18	9
ESE	1.7	2.3	8	2
SE	1.6	2.2	1	4
SSE	1.1	1.9	0	1
S	1.4	2.1	4	4
SSW	1.5	2.1	3	12
SW	1.5	2.2	10	36
WSW	1.3	2.0	6	14
W	1.2	1.8	12	4
WNW	0.9	1.3	0	0
NW	0.6	0.9	0	0
NNW	0.4	0.9	0	0
N	0.6	1.1	0	0

TABLE C-4
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 13					LOCATION 13				LOCATION 13			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.4	1.9	2	3	NNE	0.8	1.4	0	0	NNE	0.7	1.2	0	0
NE	1.5	2.0	12	8	NE	0.6	1.2	0	0	NE	0.9	1.6	5	3
ENE	1.6	2.1	6	1	ENE	1.9	2.6	22	4	ENE	1.5	2.0	9	1
E	1.6	2.2	5	3	E	1.2	2.1	5	2	E	1.1	1.8	2	1
ESE	1.3	1.8	0	0	ESE	1.0	1.9	0	0	ESE	1.1	1.7	0	0
SE	1.3	1.9	0	1	SE	0.7	1.4	0	0	SE	1.0	1.6	0	0
SSE	1.0	1.6	0	0	SSE	0.8	1.7	0	0	SSE	1.1	1.8	0	0
S	0.5	1.2	0	0	S	2.0	2.9	17	16	S	1.7	2.5	15	13
SSW	1.4	2.1	1	6	SSW	2.4	2.9	39	50	SSW	1.9	2.5	27	35
SW	1.9	2.4	10	34	SW	1.8	2.4	12	27	SW	1.7	2.3	21	39
WSW	1.6	2.2	8	17	WSW	1.0	1.8	1	1	WSW	1.1	1.8	3	5
W	1.7	2.3	35	16	W	1.1	1.7	3	0	W	1.2	1.8	16	3
WNW	1.5	2.1	18	8	WNW	0.9	1.5	0	0	WNW	1.0	1.5	2	0
NW	1.3	1.8	2	1	NW	0.6	1.0	0	0	NW	0.6	1.0	0	0
NNW	1.4	2.1	1	2	NNW	0.8	1.0	0	0	NNW	0.5	0.9	0	0
N	1.2	1.8	0	0	N	0.4	0.9	0	0	N	0.4	0.9	0	0
LOCATION 14					LOCATION 14				LOCATION 14			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.4	1.9	2	4	NNE	2.0	2.8	27	17	NNE	2.0	2.7	31	22
NE	1.4	2.0	9	7	NE	0.9	1.6	1	1	NE	1.1	1.8	5	4
ENE	1.5	2.1	5	1	ENE	1.0	1.5	0	0	ENE	1.6	2.3	14	3
E	1.5	2.0	3	2	E	0.9	1.6	0	0	E	1.2	2.0	4	2
ESE	1.3	1.8	0	0	ESE	0.8	1.6	0	0	ESE	1.1	1.7	0	0
SE	1.5	2.0	0	1	SE	1.1	1.8	0	0	SE	1.2	1.7	0	0
SSE	0.8	1.3	0	0	SSE	1.8	2.6	1	2	SSE	1.5	2.3	1	1
S	0.6	1.2	0	0	S	2.3	3.0	16	17	S	1.9	2.5	9	10
SSW	1.3	2.0	1	5	SSW	2.3	2.8	21	35	SSW	1.8	2.3	7	20
SW	1.7	2.2	4	24	SW	1.5	2.1	2	9	SW	1.4	2.0	2	13
WSW	1.6	2.2	7	17	WSW	0.7	1.4	0	0	WSW	0.8	1.4	0	0
W	1.7	2.3	38	21	W	1.0	1.5	0	0	W	0.9	1.5	1	0
WNW	1.6	2.2	29	16	WNW	1.0	1.8	3	1	WNW	0.8	1.3	0	0
NW	1.3	1.8	1	1	NW	0.9	1.5	0	0	NW	0.7	1.1	0	0
NNW	1.1	1.8	0	0	NNW	2.1	2.7	21	13	NNW	1.9	2.5	18	15
N	1.3	1.8	0	0	N	1.9	2.5	7	4	N	1.8	2.4	10	7
LOCATION 15					LOCATION 15				LOCATION 15			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.6	2.2	5	5	NNE	1.6	2.4	6	7	NNE	1.3	2.0	1	2
NE	1.3	1.8	4	3	NE	1.1	1.7	1	1	NE	1.2	1.9	3	3
ENE	1.0	1.5	0	0	ENE	1.2	1.8	1	0	ENE	1.2	1.9	1	0
E	1.0	1.7	1	0	E	1.5	2.2	3	2	E	1.4	2.1	1	1
ESE	0.6	1.0	0	0	ESE	1.4	2.0	0	0	ESE	1.3	1.9	0	0
SE	0.5	0.8	0	0	SE	1.4	1.9	0	0	SE	1.3	1.8	0	0
SSE	0.9	1.2	0	0	SSE	0.9	1.5	0	0	SSE	1.0	1.5	0	0
S	0.8	1.3	0	0	S	1.3	1.9	0	0	S	1.3	1.9	0	0
SSW	1.1	1.9	0	1	SSW	1.5	2.0	0	1	SSW	1.5	2.0	0	2
SW	1.6	2.3	7	24	SW	2.0	2.6	7	33	SW	1.9	2.4	4	25
WSW	1.9	2.6	24	41	WSW	1.7	2.4	5	13	WSW	1.7	2.4	6	18
W	1.8	2.5	48	21	W	1.7	2.4	27	13	W	1.7	2.5	31	17
WNW	1.2	2.0	10	4	WNW	1.7	2.6	45	25	WNW	1.7	2.6	51	30
NW	0.8	1.6	0	0	NW	1.5	2.1	3	3	NW	1.4	2.0	1	1
NNW	1.1	1.8	0	0	NNW	0.8	1.3	0	0	NNW	0.6	1.1	0	0
N	1.5	2.0	1	1	N	1.4	2.1	1	1	N	1.2	2.0	0	0

TABLE C-5
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 16					LOCATION 16				LOCATION 16			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.0	1.5	0	0	NNE	1.5	2.1	1	3	NNE	1.1	1.8	0	1
NE	1.2	1.7	1	2	NE	1.1	1.7	1	1	NE	1.2	1.8	1	1
ENE	1.2	1.7	0	0	ENE	1.4	1.9	1	0	ENE	1.4	1.9	1	0
E	1.4	2.0	1	1	E	1.2	1.8	0	0	E	1.1	1.7	0	0
ESE	1.3	1.8	0	0	ESE	0.9	1.3	0	0	ESE	0.9	1.3	0	0
SE	1.1	1.7	0	0	SE	1.0	1.5	0	0	SE	1.0	1.5	0	0
SSE	1.2	1.8	0	0	SSE	0.8	1.4	0	0	SSE	0.7	1.4	0	0
S	0.9	1.6	0	0	S	1.2	1.9	0	0	S	1.1	1.8	0	0
SSW	0.7	1.4	0	0	SSW	1.5	2.2	0	3	SSW	1.4	2.0	0	2
SW	1.5	2.2	1	16	SW	1.8	2.4	2	17	SW	1.6	2.3	1	14
WSW	1.7	2.3	4	15	WSW	1.9	2.7	11	27	WSW	1.9	2.6	12	30
W	2.1	2.7	53	39	W	1.8	2.7	41	24	W	1.8	2.7	43	27
WNW	2.0	2.5	36	25	WNW	1.8	2.7	43	25	WNW	1.7	2.6	42	25
NW	1.5	2.0	1	2	NW	1.0	1.7	0	0	NW	0.8	1.6	0	0
NNW	1.5	2.2	1	2	NNW	1.2	1.8	0	0	NNW	0.9	1.5	0	0
N	1.1	1.6	0	0	N	1.2	1.9	0	0	N	1.2	2.0	0	0
LOCATION 17					LOCATION 17				LOCATION 17			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.2	2.0	2	4	NNE	1.1	1.8	1	2	NNE	1.1	1.8	1	3
NE	1.6	2.3	22	16	NE	1.5	2.2	15	12	NE	1.2	1.9	9	7
ENE	1.3	2.0	2	1	ENE	1.4	2.0	4	1	ENE	1.4	1.9	3	1
E	1.5	2.1	3	2	E	1.5	2.0	2	2	E	1.4	1.9	2	2
ESE	1.5	2.0	0	0	ESE	1.2	1.8	0	0	ESE	1.2	1.7	0	0
SE	1.9	2.5	0	4	SE	1.7	2.3	0	3	SE	1.5	2.1	0	2
SSE	1.4	2.1	0	1	SSE	1.1	1.8	0	0	SSE	1.0	1.7	0	0
S	1.6	2.2	2	2	S	1.1	1.8	0	0	S	1.0	1.6	0	0
SSW	0.9	1.4	0	0	SSW	1.2	1.9	0	3	SSW	1.3	1.9	0	4
SW	1.3	1.9	0	9	SW	1.4	2.0	1	14	SW	1.3	2.0	2	16
WSW	1.5	2.2	4	14	WSW	1.5	2.2	5	16	WSW	1.4	2.1	5	15
W	1.6	2.3	34	22	W	1.7	2.3	33	21	W	1.7	2.3	42	26
WNW	1.6	2.1	18	12	WNW	1.6	2.3	36	23	WNW	1.5	2.2	34	21
NW	1.6	2.1	8	8	NW	0.5	1.2	0	0	NW	0.5	1.1	0	0
NNW	1.6	2.1	1	3	NNW	1.4	1.9	0	1	NNW	1.3	1.9	0	1
N	1.4	1.9	1	1	N	1.4	2.1	2	2	N	1.2	1.9	1	1
LOCATION 18					LOCATION 18				LOCATION 18			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.4	1.9	2	5	NNE	1.6	2.5	17	16	NNE	1.3	2.2	8	9
NE	1.2	1.7	3	4	NE	1.4	2.0	13	10	NE	1.4	2.0	14	10
ENE	1.4	1.9	3	1	ENE	1.5	2.1	7	2	ENE	1.5	2.1	8	2
E	1.3	1.9	2	2	E	1.4	1.9	2	2	E	1.4	2.0	3	2
ESE	1.0	1.5	0	0	ESE	1.1	1.7	0	0	ESE	1.1	1.6	0	0
SE	1.3	1.9	0	1	SE	1.0	1.6	0	0	SE	1.2	1.6	0	0
SSE	0.8	1.4	0	0	SSE	0.6	1.3	0	0	SSE	0.9	1.3	0	0
S	0.7	1.4	0	0	S	1.2	1.9	1	1	S	1.2	1.8	1	0
SSW	0.8	1.5	0	0	SSW	1.3	2.0	1	7	SSW	1.3	1.9	1	5
SW	1.3	1.9	1	10	SW	1.5	2.1	3	20	SW	1.5	2.1	4	24
WSW	1.5	2.1	5	17	WSW	1.1	1.8	1	3	WSW	1.2	1.9	2	6
W	1.8	2.4	55	40	W	1.3	2.2	31	17	W	1.4	2.4	51	32
WNW	1.6	2.1	25	17	WNW	1.0	1.8	7	4	WNW	1.1	1.8	6	4
NW	1.4	1.9	3	3	NW	0.9	1.7	1	1	NW	0.6	1.1	0	0
NNW	1.2	1.8	0	1	NNW	1.9	2.5	16	16	NNW	1.4	2.1	2	4
N	1.4	1.8	1	1	N	1.0	1.7	0	0	N	1.1	1.9	1	1

TABLE C-6
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 19					LOCATION 19				LOCATION 19			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.4	1.9	2	3	NNE	2.3	3.1	34	27	NNE	2.0	2.6	31	24
NE	1.5	2.0	10	7	NE	1.2	1.9	3	4	NE	0.7	1.3	0	0
ENE	1.7	2.2	8	2	ENE	1.6	2.3	5	1	ENE	1.7	2.2	12	4
E	1.5	2.1	3	2	E	1.2	1.9	1	1	E	1.5	2.0	6	4
ESE	1.4	2.0	0	0	ESE	1.6	2.1	0	0	ESE	1.8	2.3	6	2
SE	1.6	2.1	0	2	SE	1.9	2.4	0	2	SE	1.9	2.4	1	5
SSE	0.9	1.4	0	0	SSE	2.1	3.0	2	4	SSE	2.0	2.8	4	6
S	0.4	1.1	0	0	S	2.0	3.2	18	30	S	1.9	2.9	26	41
SSW	1.4	2.0	1	5	SSW	0.7	1.1	0	0	SSW	0.4	1.1	0	0
SW	1.9	2.4	8	33	SW	0.7	1.2	0	0	SW	0.4	0.4	0	0
WSW	1.7	2.3	8	18	WSW	0.8	1.3	0	0	WSW	0.7	1.1	0	0
W	1.7	2.3	36	17	W	1.0	1.6	0	0	W	0.6	1.0	0	0
WNW	1.5	2.1	20	10	WNW	1.4	2.3	20	13	WNW	0.5	0.8	0	0
NW	1.3	1.9	2	1	NW	1.1	1.8	0	0	NW	0.7	1.2	0	0
NNW	1.2	1.8	0	0	NNW	2.0	2.6	9	11	NNW	1.7	2.2	7	8
N	1.3	1.8	0	0	N	2.0	2.6	7	6	N	1.7	2.2	7	6
LOCATION 20					LOCATION 20					LOCATION 20				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.4	2.1	3	4	NNE	2.4	3.1	18	20	NNE	2.1	2.7	41	34
NE	1.6	2.1	10	7	NE	1.2	1.8	1	1	NE	0.7	1.4	1	2
ENE	1.7	2.3	9	2	ENE	2.2	2.8	10	4	ENE	1.3	1.9	5	2
E	1.3	1.9	1	1	E	2.0	2.8	7	6	E	1.6	2.2	13	9
ESE	1.4	2.0	0	0	ESE	2.2	2.7	2	1	ESE	2.0	2.5	15	12
SE	1.5	2.0	0	1	SE	1.9	2.4	0	2	SE	1.9	2.4	1	7
SSE	0.8	1.4	0	0	SSE	1.6	2.3	0	0	SSE	1.5	2.1	1	2
S	0.7	1.4	0	0	S	1.5	2.3	1	1	S	1.4	2.1	4	7
SSW	1.6	2.2	1	6	SSW	1.1	1.6	0	0	SSW	0.6	1.1	0	0
SW	1.9	2.4	8	31	SW	0.9	1.5	0	0	SW	0.7	1.0	0	0
WSW	1.7	2.3	6	15	WSW	0.8	1.4	0	0	WSW	0.4	0.8	0	0
W	1.8	2.5	42	22	W	1.2	2.0	2	1	W	0.5	0.8	0	0
WNW	1.6	2.1	17	9	WNW	1.8	2.8	42	34	WNW	0.4	0.8	0	0
NW	1.3	1.8	1	1	NW	1.6	2.3	2	3	NW	1.1	1.5	0	1
NNW	1.3	2.0	0	1	NNW	2.5	3.1	16	23	NNW	1.8	2.3	15	20
N	1.3	1.9	0	0	N	1.9	2.4	1	2	N	1.5	2.0	3	4
LOCATION 21					LOCATION 21					LOCATION 21				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.2	1.8	1	2	NNE	0.8	1.6	0	0	NNE	1.0	1.5	13	14
NE	1.7	2.1	14	9	NE	0.9	1.5	0	1	NE	0.4	1.0	2	2
ENE	1.8	2.3	10	2	ENE	2.3	3.0	26	14	ENE	0.7	1.2	2	0
E	1.4	1.9	1	1	E	2.3	3.2	30	21	E	1.3	1.8	31	18
ESE	1.5	2.1	1	0	ESE	2.6	3.2	18	19	ESE	1.5	2.0	30	27
SE	1.6	2.1	0	1	SE	2.0	2.5	0	3	SE	1.4	1.8	3	10
SSE	0.9	1.4	0	0	SSE	1.5	2.1	0	0	SSE	0.9	1.3	0	1
S	1.0	1.7	0	0	S	1.2	2.0	0	0	S	1.1	1.7	9	15
SSW	1.7	2.2	2	8	SSW	1.4	2.1	0	4	SSW	0.6	1.0	0	1
SW	1.9	2.4	7	30	SW	0.8	1.3	0	0	SW	0.1	0.7	0	0
WSW	1.8	2.4	10	21	WSW	0.7	1.2	0	0	WSW	0.4	0.7	0	0
W	1.7	2.4	37	17	W	0.9	1.4	0	0	W	0.6	1.0	1	0
WNW	1.5	2.1	16	8	WNW	1.1	1.9	2	3	WNW	0.4	0.7	0	0
NW	1.2	1.8	1	0	NW	1.5	2.4	9	12	NW	0.6	1.1	1	1
NNW	1.2	1.9	0	0	NNW	2.0	2.8	14	22	NNW	0.9	1.4	3	5
N	1.0	1.6	0	0	N	1.2	1.7	0	0	N	0.7	1.4	3	3

TABLE C-7
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 22					LOCATION 22				LOCATION 22			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.4	1.9	1	2	NNE	1.8	2.4	8	10	NNE	0.3	0.7	0	0
NE	1.6	2.1	12	8	NE	1.0	1.6	1	1	NE	0.4	0.9	1	2
ENE	1.7	2.3	8	2	ENE	0.9	1.7	0	0	ENE	0.5	0.9	0	0
E	1.3	1.9	1	1	E	1.0	1.7	0	0	E	0.5	0.9	0	0
ESE	1.5	2.0	0	0	ESE	1.6	2.4	2	0	ESE	0.6	1.0	0	0
SE	1.3	1.8	0	1	SE	2.1	2.8	1	6	SE	0.3	0.6	0	0
SSE	0.9	1.6	0	0	SSE	2.1	2.8	2	4	SSE	0.6	0.8	0	0
S	0.9	1.6	0	0	S	2.0	2.7	7	11	S	0.1	1.0	1	1
SSW	1.8	2.2	2	8	SSW	1.4	2.3	2	9	SSW	0.5	0.9	0	1
SW	2.0	2.5	10	34	SW	0.9	1.5	0	0	SW	0.6	0.8	0	1
WSW	1.8	2.4	11	22	WSW	1.4	2.0	2	6	WSW	0.7	1.1	3	12
W	1.8	2.4	37	16	W	1.5	2.0	8	3	W	0.8	1.1	13	8
WNW	1.5	2.1	16	7	WNW	1.9	2.5	51	30	WNW	0.8	1.1	17	13
NW	0.9	1.5	0	0	NW	1.5	2.1	3	3	NW	0.9	1.3	36	28
NNW	0.8	1.4	0	0	NNW	1.7	2.4	4	6	NNW	0.8	1.3	6	10
N	1.1	1.7	0	0	N	1.9	2.6	8	7	N	0.8	1.6	23	22
LOCATION 23					LOCATION 23					LOCATION 23				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.5	2.0	2	3	NNE	0.9	1.4	0	0	NNE	0.8	1.2	0	0
NE	1.6	2.1	13	8	NE	1.1	1.7	0	1	NE	0.7	1.3	1	1
ENE	1.7	2.3	11	2	ENE	0.9	1.6	0	0	ENE	0.6	1.0	0	0
E	1.2	1.8	1	1	E	1.7	2.4	3	2	E	0.8	1.2	0	0
ESE	1.6	2.1	1	0	ESE	2.3	3.1	9	5	ESE	0.7	1.1	0	0
SE	1.4	2.0	0	1	SE	2.4	3.2	1	7	SE	0.3	0.8	0	0
SSE	1.0	1.7	0	0	SSE	2.4	3.1	1	3	SSE	0.6	0.9	0	0
S	0.8	1.4	0	0	S	2.3	2.9	6	10	S	0.1	0.8	0	0
SSW	1.7	2.2	2	8	SSW	1.3	2.3	0	4	SSW	0.6	1.0	0	0
SW	1.9	2.4	8	31	SW	0.9	1.5	0	0	SW	0.7	1.1	0	0
WSW	1.8	2.3	10	21	WSW	1.7	2.3	2	8	WSW	1.3	2.0	13	36
W	1.8	2.4	37	17	W	1.9	2.5	20	12	W	1.5	2.3	79	61
WNW	1.5	2.0	15	7	WNW	2.1	2.7	40	27	WNW	1.0	1.6	9	6
NW	0.9	1.5	0	0	NW	1.7	2.3	2	3	NW	0.4	0.8	0	0
NNW	1.0	1.6	0	0	NNW	2.2	2.8	8	11	NNW	0.5	1.0	0	0
N	1.2	1.8	0	0	N	2.1	2.8	6	6	N	0.7	1.2	0	0
LOCATION 24					LOCATION 24					LOCATION 24				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.3	1.8	1	2	NNE	1.0	1.5	0	0	NNE	0.2	0.5	0	0
NE	1.5	2.0	8	5	NE	1.2	1.9	0	1	NE	0.4	0.9	0	0
ENE	1.6	2.2	6	1	ENE	0.8	1.4	0	0	ENE	0.5	1.0	0	0
E	1.3	1.9	1	1	E	1.9	2.6	3	3	E	1.0	1.6	9	4
ESE	1.4	2.0	0	0	ESE	2.3	3.0	3	1	ESE	1.4	2.1	27	12
SE	1.4	2.0	0	1	SE	2.4	3.0	0	4	SE	1.6	2.3	10	13
SSE	1.0	1.6	0	0	SSE	2.2	2.9	0	1	SSE	1.3	1.8	2	3
S	0.8	1.4	0	0	S	2.2	2.8	2	4	S	1.3	1.8	8	8
SSW	1.6	2.2	2	7	SSW	1.9	2.6	0	6	SSW	1.6	2.0	31	50
SW	1.9	2.4	10	33	SW	0.8	1.4	0	0	SW	0.6	1.1	0	1
WSW	1.8	2.4	11	22	WSW	1.6	2.4	1	5	WSW	0.5	1.2	1	1
W	1.8	2.4	40	18	W	2.1	2.8	21	15	W	0.8	1.4	13	3
WNW	1.6	2.1	21	9	WNW	2.3	3.2	60	44	WNW	0.6	1.1	1	0
NW	1.1	1.7	0	0	NW	1.7	2.3	1	2	NW	0.1	1.0	0	0
NNW	1.1	1.7	0	0	NNW	2.3	3.0	6	11	NNW	0.1	0.2	0	0
N	1.2	1.7	0	0	N	1.8	2.6	1	2	N	0.6	1.0	0	0

TABLE C-8
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 25					LOCATION 25				LOCATION 25			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.4	1.9	2	3	NNE	1.0	1.8	0	1	NNE	0.5	1.1	0	0
NE	1.4	1.9	8	6	NE	1.2	2.1	2	3	NE	0.7	1.4	0	1
ENE	1.5	2.1	6	1	ENE	1.8	2.3	3	1	ENE	0.4	1.1	0	0
E	1.5	2.0	4	2	E	1.5	2.2	1	1	E	0.9	1.6	0	0
ESE	1.5	2.0	1	0	ESE	1.7	2.3	0	0	ESE	1.2	1.9	0	0
SE	1.6	2.1	0	2	SE	1.8	2.4	0	1	SE	1.4	2.1	0	2
SSE	1.0	1.8	0	0	SSE	1.7	2.5	0	1	SSE	1.4	2.1	0	1
S	0.8	1.4	0	0	S	1.6	2.4	1	1	S	0.7	1.3	0	0
SSW	1.2	1.9	0	4	SSW	1.8	2.5	1	7	SSW	0.6	1.3	0	0
SW	1.7	2.2	5	25	SW	1.5	2.2	0	6	SW	0.5	1.0	0	0
WSW	1.7	2.2	9	20	WSW	1.5	2.4	2	9	WSW	1.4	2.2	9	27
W	1.7	2.3	42	22	W	1.7	2.5	18	12	W	1.6	2.5	60	47
WNW	1.6	2.1	23	12	WNW	2.2	3.0	61	42	WNW	1.3	2.2	31	22
NW	1.1	1.7	0	0	NW	1.6	2.1	1	1	NW	0.7	1.2	0	0
NNW	1.2	1.8	0	1	NNW	2.2	2.9	9	13	NNW	0.8	1.3	0	0
N	1.3	1.9	1	1	N	1.5	2.2	0	1	N	0.8	1.5	0	0
LOCATION 26					LOCATION 26					LOCATION 26				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.5	2.0	3	3	NNE	1.7	2.2	5	4	NNE	1.5	2.0	20	21
NE	1.6	2.1	14	7	NE	0.6	1.2	0	0	NE	0.5	1.1	0	1
ENE	1.5	2.1	6	1	ENE	1.2	1.9	2	0	ENE	1.2	1.8	9	4
E	1.3	2.0	3	1	E	1.7	2.4	8	3	E	1.4	1.9	11	8
ESE	1.5	2.0	1	0	ESE	1.4	2.2	1	0	ESE	0.9	1.5	0	0
SE	1.2	1.8	0	0	SE	1.2	1.9	0	0	SE	0.4	0.7	0	0
SSE	1.1	1.8	0	0	SSE	1.7	2.4	0	1	SSE	0.6	1.0	0	0
S	1.0	1.7	0	0	S	2.1	2.7	9	7	S	0.8	1.2	0	0
SSW	1.8	2.3	6	12	SSW	2.6	3.2	48	62	SSW	1.0	1.4	0	2
SW	2.0	2.4	13	32	SW	1.3	2.2	2	9	SW	0.5	0.8	0	0
WSW	2.0	2.6	23	35	WSW	0.8	1.5	0	0	WSW	0.6	1.2	0	1
W	1.5	2.2	30	8	W	0.8	1.5	0	0	W	0.6	1.2	1	0
WNW	0.9	1.5	1	0	WNW	0.8	1.5	0	0	WNW	0.7	1.3	1	2
NW	1.0	1.7	0	0	NW	1.0	1.8	1	0	NW	1.1	1.8	19	18
NNW	1.1	1.7	0	0	NNW	1.1	2.0	0	0	NNW	0.9	1.6	1	4
N	1.3	1.9	1	0	N	2.3	3.0	23	12	N	1.9	2.4	36	34
LOCATION 27					LOCATION 27					LOCATION 27				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.5	2.1	4	4	NNE	0.9	1.2	0	0	NNE	0.1	0.7	0	0
NE	1.5	2.0	11	6	NE	0.7	1.2	0	0	NE	0.5	0.9	0	0
ENE	1.6	2.1	6	1	ENE	0.7	1.3	0	0	ENE	0.1	1.3	1	0
E	1.2	1.7	1	0	E	1.3	1.9	1	0	E	0.6	1.0	0	0
ESE	1.6	2.1	1	0	ESE	1.2	1.9	0	0	ESE	0.6	1.0	0	0
SE	1.2	1.8	0	0	SE	1.2	1.8	0	0	SE	0.4	0.9	0	0
SSE	1.2	1.9	0	0	SSE	1.6	2.2	0	0	SSE	0.6	1.0	0	0
S	0.9	1.5	0	0	S	2.0	2.7	6	3	S	0.7	1.1	0	0
SSW	1.7	2.2	2	7	SSW	2.8	3.4	57	63	SSW	0.6	1.1	0	0
SW	2.0	2.5	15	38	SW	1.6	2.7	13	26	SW	0.7	1.1	0	1
WSW	1.9	2.4	15	26	WSW	1.3	1.9	1	1	WSW	1.1	1.6	7	23
W	1.7	2.3	38	14	W	1.3	1.8	2	0	W	1.2	1.9	67	55
WNW	1.2	1.8	5	2	WNW	1.3	1.8	2	0	WNW	1.0	1.5	14	12
NW	1.1	1.8	1	1	NW	1.8	2.4	15	4	NW	1.1	1.6	10	10
NNW	1.2	1.8	0	0	NNW	1.6	2.3	2	1	NNW	1.0	1.4	0	1
N	1.3	1.9	0	0	N	1.1	1.8	0	0	N	0.8	1.3	0	0

TABLE C-9
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 28					LOCATION 28				LOCATION 28			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.5	2.0	2	4	NNE	1.0	1.4	0	0	NNE	0.3	0.7	0	0
NE	1.5	2.1	12	8	NE	0.7	1.1	0	0	NE	0.5	0.8	0	0
ENE	1.6	2.2	7	1	ENE	0.7	1.3	0	0	ENE	0.1	0.9	0	0
E	1.2	1.8	1	1	E	1.1	1.7	0	0	E	0.7	1.2	0	0
ESE	1.6	2.1	1	0	ESE	1.0	1.8	0	0	ESE	0.7	1.3	0	0
SE	1.3	1.8	0	1	SE	1.4	2.2	0	1	SE	0.6	1.2	0	0
SSE	1.3	2.0	0	0	SSE	2.0	2.8	1	2	SSE	1.2	1.8	1	2
S	1.0	1.6	0	0	S	1.8	2.3	1	1	S	1.1	1.6	1	1
SSW	1.6	2.2	2	7	SSW	2.4	3.0	16	29	SSW	1.6	2.2	28	54
SW	1.9	2.4	9	32	SW	1.7	2.7	11	31	SW	0.8	1.2	0	1
WSW	1.8	2.3	10	20	WSW	1.9	2.6	10	16	WSW	0.8	1.5	2	6
W	1.8	2.4	40	18	W	2.0	2.6	32	11	W	1.2	1.9	59	33
WNW	1.4	2.0	12	6	WNW	1.9	2.4	26	10	WNW	0.9	1.5	10	5
NW	1.2	1.9	2	1	NW	1.7	2.1	2	1	NW	0.7	1.1	0	0
NNW	1.3	1.9	0	0	NNW	1.5	2.1	0	0	NNW	0.6	1.0	0	0
N	1.5	2.0	1	1	N	1.1	1.7	0	0	N	0.3	1.1	0	0
LOCATION 29					LOCATION 29					LOCATION 29				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.5	2.0	2	4	NNE	0.8	1.2	0	0	NNE	0.4	0.9	0	0
NE	1.4	2.0	8	6	NE	0.9	1.4	0	0	NE	0.5	0.9	0	0
ENE	1.6	2.2	7	1	ENE	0.1	1.1	0	0	ENE	0.7	1.1	0	0
E	1.4	2.0	2	1	E	1.1	1.8	0	0	E	1.3	2.1	15	9
ESE	1.6	2.2	1	0	ESE	1.5	2.4	0	0	ESE	2.0	2.8	49	48
SE	1.3	1.9	0	1	SE	2.6	3.6	3	9	SE	2.3	3.1	22	24
SSE	1.4	2.1	0	1	SSE	2.4	3.3	2	4	SSE	2.1	3.0	12	15
S	1.0	1.6	0	0	S	1.1	1.8	0	0	S	1.1	1.8	3	4
SSW	1.4	2.0	0	3	SSW	1.0	1.8	0	0	SSW	0.7	1.3	0	0
SW	1.8	2.3	7	30	SW	1.3	2.1	0	2	SW	0.6	1.1	0	0
WSW	1.7	2.3	10	22	WSW	2.2	2.9	13	33	WSW	0.7	1.0	0	0
W	1.8	2.4	38	18	W	2.3	2.9	44	28	W	0.8	1.3	1	0
WNW	1.5	2.1	19	9	WNW	2.2	2.8	36	22	WNW	0.7	1.1	0	0
NW	1.3	1.9	2	2	NW	1.8	2.2	1	1	NW	0.3	0.7	0	0
NNW	1.2	1.9	0	0	NNW	1.4	1.8	0	0	NNW	0.4	0.8	0	0
N	1.5	2.1	2	1	N	0.9	1.5	0	0	N	0.1	0.8	0	0
LOCATION 30					LOCATION 30					LOCATION 30				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.4	1.9	2	4	NNE	0.9	1.5	0	0	NNE	0.7	1.1	0	0
NE	1.3	1.9	6	5	NE	1.0	1.6	0	1	NE	0.6	1.1	0	1
ENE	1.5	2.1	7	1	ENE	1.9	2.5	5	1	ENE	1.8	2.3	31	15
E	1.5	2.0	3	2	E	1.7	2.4	3	3	E	1.5	2.2	19	13
ESE	1.5	2.1	1	0	ESE	2.3	2.9	4	2	ESE	2.1	2.7	37	40
SE	1.3	1.8	0	1	SE	2.4	3.0	1	6	SE	2.0	2.7	7	15
SSE	1.4	2.0	0	1	SSE	2.0	2.8	1	2	SSE	1.5	2.3	2	5
S	1.0	1.6	0	0	S	0.9	1.8	0	0	S	0.9	1.5	0	0
SSW	1.2	1.8	0	2	SSW	1.2	1.8	0	0	SSW	1.0	1.5	0	3
SW	1.7	2.2	6	27	SW	1.1	1.7	0	0	SW	0.8	1.3	0	2
WSW	1.7	2.3	10	23	WSW	2.1	2.7	10	29	WSW	0.9	1.5	1	4
W	1.7	2.3	39	20	W	2.2	2.8	40	29	W	0.8	1.5	3	2
WNW	1.5	2.1	21	11	WNW	2.1	2.7	36	25	WNW	0.3	1.0	0	0
NW	1.2	1.9	2	2	NW	1.6	2.1	1	1	NW	0.1	0.7	0	0
NNW	1.2	1.8	0	0	NNW	1.2	1.7	0	0	NNW	0.5	0.8	0	0
N	1.5	2.0	2	1	N	1.0	1.7	0	0	N	0.1	0.7	0	0

TABLE C-10
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER					PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES				
LOCATION 31					LOCATION 31					LOCATION 31				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.4	2.0	3	5	NNE	0.7	1.2	0	0	NNE	0.5	0.9	0	0
NE	1.3	1.8	4	4	NE	0.6	1.2	0	0	NE	0.6	1.3	1	1
ENE	1.6	2.2	7	2	ENE	1.9	2.5	30	8	ENE	1.9	2.5	41	16
E	1.5	2.0	3	2	E	1.3	2.2	10	4	E	1.3	2.2	15	8
ESE	1.7	2.3	3	0	ESE	1.4	2.3	7	1	ESE	1.5	2.4	16	7
SE	1.4	2.0	0	1	SE	0.9	1.8	0	1	SE	0.8	1.8	0	1
SSE	1.5	2.2	0	1	SSE	0.5	1.3	0	0	SSE	0.1	1.1	0	0
S	1.2	1.9	0	0	S	0.8	1.8	1	0	S	0.6	1.5	0	0
SSW	1.0	1.7	0	1	SSW	2.1	2.8	48	67	SSW	1.7	2.3	18	39
SW	1.6	2.2	4	22	SW	1.4	2.0	5	19	SW	1.4	2.0	7	29
WSW	1.7	2.3	10	24	WSW	0.7	1.1	0	0	WSW	0.5	1.1	0	0
W	1.7	2.3	35	18	W	0.7	0.9	0	0	W	0.4	0.9	0	0
WNW	1.3	1.9	11	6	WNW	0.7	1.1	0	0	WNW	0.6	1.1	0	0
NW	1.6	2.2	16	11	NW	0.7	1.0	0	0	NW	0.6	0.9	0	0
NNW	1.4	1.9	0	1	NNW	0.7	1.0	0	0	NNW	0.6	0.9	0	0
N	1.6	2.1	2	2	N	0.7	1.2	0	0	N	0.7	1.2	0	0
LOCATION 32					LOCATION 32					LOCATION 32				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.4	2.0	2	4	NNE	0.9	1.5	1	1	NNE	0.7	1.4	2	2
NE	1.2	1.7	2	2	NE	1.0	1.7	13	5	NE	0.9	1.6	17	8
ENE	1.7	2.3	9	2	ENE	1.5	2.1	19	3	ENE	1.2	1.8	16	3
E	1.3	1.9	2	1	E	0.7	1.4	1	0	E	0.7	1.4	1	1
ESE	1.8	2.4	3	1	ESE	1.0	1.7	1	0	ESE	1.1	1.8	4	0
SE	1.7	2.3	0	3	SE	0.9	1.6	0	1	SE	0.9	1.6	0	1
SSE	1.5	2.2	0	1	SSE	1.2	2.0	1	1	SSE	1.3	2.0	2	2
S	1.3	1.9	1	1	S	1.1	1.8	3	1	S	1.1	1.8	5	3
SSW	1.1	1.7	0	1	SSW	1.9	2.5	41	49	SSW	1.6	2.3	41	53
SW	1.6	2.2	3	23	SW	1.5	2.2	23	39	SW	1.2	1.8	13	29
WSW	1.7	2.2	6	15	WSW	0.8	1.2	0	0	WSW	0.5	1.0	0	0
W	1.6	2.2	25	13	W	0.9	1.2	0	0	W	0.6	1.0	0	0
WNW	1.1	1.7	2	1	WNW	0.9	1.2	0	0	WNW	0.6	1.0	0	0
NW	1.9	2.5	42	27	NW	0.6	1.0	0	0	NW	0.5	0.9	0	0
NNW	1.3	1.9	0	1	NNW	0.6	0.8	0	0	NNW	0.3	0.3	0	0
N	1.6	2.2	2	3	N	0.4	1.0	0	0	N	0.5	0.9	0	0
LOCATION 33					LOCATION 33					LOCATION 33				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.4	2.0	3	5	NNE	1.0	1.5	0	0	NNE	0.9	1.4	0	1
NE	1.1	1.6	2	2	NE	1.5	2.5	43	24	NE	1.4	2.4	44	28
ENE	1.7	2.3	12	3	ENE	1.9	2.8	35	13	ENE	1.9	2.8	43	22
E	1.2	1.8	1	1	E	0.5	1.2	0	0	E	0.7	1.4	0	0
ESE	1.8	2.4	4	1	ESE	0.7	1.4	0	0	ESE	0.9	1.6	0	0
SE	1.7	2.2	0	3	SE	0.7	1.4	0	0	SE	0.8	1.6	0	0
SSE	1.4	2.0	0	1	SSE	1.3	2.3	1	2	SSE	1.4	2.3	1	3
S	1.4	2.0	1	1	S	1.2	2.1	2	2	S	1.0	2.0	2	3
SSW	1.2	1.9	0	4	SSW	1.8	2.6	16	38	SSW	1.7	2.4	10	34
SW	1.6	2.1	3	21	SW	1.5	2.1	4	21	SW	1.2	1.8	0	9
WSW	1.7	2.2	8	20	WSW	0.7	1.2	0	0	WSW	0.6	1.2	0	0
W	1.4	2.1	22	10	W	0.8	1.2	0	0	W	0.6	1.1	0	0
WNW	1.4	2.1	20	11	WNW	0.8	1.3	0	0	WNW	0.7	1.2	0	0
NW	1.7	2.3	22	14	NW	0.7	1.0	0	0	NW	0.5	0.9	0	0
NNW	1.4	2.0	1	2	NNW	0.6	0.9	0	0	NNW	0.5	0.5	0	0
N	1.3	1.9	1	1	N	0.7	1.1	0	0	N	0.5	1.0	0	0

TABLE C-11
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 34					LOCATION 34				LOCATION 34			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.1	1.7	1	2	NNE	2.3	3.0	20	18	NNE	2.0	2.6	15	14
NE	0.9	1.4	1	1	NE	2.2	2.9	38	24	NE	2.0	2.7	38	23
ENE	1.6	2.2	12	3	ENE	2.0	2.8	15	5	ENE	1.9	2.7	20	7
E	0.9	1.5	0	0	E	1.1	1.9	0	0	E	1.0	1.8	0	0
ESE	1.6	2.2	3	0	ESE	1.3	2.2	0	0	ESE	1.2	2.1	0	0
SE	1.7	2.2	0	3	SE	2.0	2.8	0	4	SE	1.8	2.5	0	4
SSE	1.6	2.2	0	1	SSE	2.1	2.9	1	2	SSE	2.0	2.7	1	3
S	1.4	2.0	2	2	S	1.9	2.6	2	3	S	1.8	2.5	4	6
SSW	1.2	1.8	0	2	SSW	2.1	2.7	5	19	SSW	2.0	2.6	8	25
SW	1.5	2.0	3	19	SW	1.6	2.3	1	9	SW	1.4	2.0	0	6
WSW	1.7	2.2	11	27	WSW	0.8	1.3	0	0	WSW	0.6	1.2	0	0
W	1.3	1.9	11	4	W	1.2	1.7	0	0	W	1.0	1.6	0	0
WNW	1.6	2.2	45	25	WNW	1.4	2.0	2	2	WNW	1.2	1.6	1	0
NW	1.5	2.0	9	7	NW	0.8	1.3	0	0	NW	1.0	1.4	0	0
NNW	1.2	1.8	0	1	NNW	1.7	2.2	0	1	NNW	1.5	2.0	0	1
N	1.3	1.8	1	1	N	2.4	3.1	14	12	N	2.2	2.7	11	9
LOCATION 35					LOCATION 35					LOCATION 35				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.4	2.0	2	4	NNE	0.9	1.6	0	0	NNE	0.8	1.4	0	0
NE	1.1	1.6	1	2	NE	1.5	2.3	14	11	NE	1.5	2.2	15	13
ENE	1.4	1.8	1	0	ENE	1.6	2.3	5	1	ENE	1.7	2.4	9	3
E	1.5	2.0	2	2	E	1.3	1.9	0	0	E	1.4	1.9	1	1
ESE	1.5	2.0	0	0	ESE	1.3	1.8	0	0	ESE	1.4	1.9	0	0
SE	1.3	1.8	0	1	SE	1.0	1.6	0	0	SE	1.1	1.7	0	0
SSE	1.2	1.8	0	0	SSE	0.7	1.3	0	0	SSE	0.8	1.4	0	0
S	0.9	1.5	0	0	S	0.8	1.5	0	0	S	0.9	1.6	0	0
SSW	0.9	1.6	0	0	SSW	1.3	2.0	0	2	SSW	1.4	2.1	0	5
SW	1.3	2.0	0	8	SW	1.3	1.9	0	3	SW	1.4	2.0	0	9
WSW	1.7	2.3	7	20	WSW	1.9	2.7	15	38	WSW	1.5	2.2	4	14
W	1.9	2.5	45	31	W	1.9	2.8	55	37	W	1.8	2.6	47	36
WNW	1.6	2.2	24	17	WNW	1.2	2.2	11	7	WNW	1.5	2.3	24	18
NW	1.6	2.3	17	14	NW	1.2	1.9	0	1	NW	1.1	1.7	0	0
NNW	1.4	1.9	0	1	NNW	0.7	1.2	0	0	NNW	0.6	0.9	0	0
N	1.4	2.0	1	1	N	0.9	1.6	0	0	N	0.9	1.4	0	0
LOCATION 36					LOCATION 36					LOCATION 36				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	0.9	1.5	0	0	NNE	1.3	2.0	4	6	NNE	1.3	2.0	3	7
NE	1.2	1.7	1	2	NE	1.4	2.1	18	14	NE	1.3	2.0	10	10
ENE	1.3	1.7	0	0	ENE	1.2	1.7	1	0	ENE	1.2	1.7	1	0
E	1.6	2.1	2	2	E	1.4	1.9	2	2	E	1.4	1.9	2	2
ESE	1.5	2.1	0	0	ESE	1.3	1.8	0	0	ESE	1.2	1.8	0	0
SE	1.5	2.1	0	2	SE	1.1	1.8	0	1	SE	1.1	1.7	0	1
SSE	1.7	2.4	0	2	SSE	1.2	1.9	0	1	SSE	1.2	1.9	0	1
S	0.6	1.2	0	0	S	0.9	1.5	0	0	S	0.9	1.6	0	0
SSW	0.6	1.1	0	0	SSW	0.8	1.4	0	0	SSW	0.8	1.5	0	0
SW	0.8	1.3	0	0	SW	0.7	1.2	0	0	SW	0.6	1.2	0	0
WSW	1.5	2.0	1	8	WSW	1.6	2.3	11	31	WSW	1.3	1.9	2	8
W	1.8	2.5	39	34	W	1.7	2.4	56	40	W	1.7	2.5	61	53
WNW	1.9	2.5	41	34	WNW	1.1	1.8	7	5	WNW	1.3	2.1	21	18
NW	1.8	2.4	16	17	NW	0.9	1.4	0	0	NW	0.7	1.3	0	0
NNW	1.4	1.9	0	1	NNW	0.6	1.1	0	0	NNW	0.4	1.0	0	0
N	1.1	1.7	0	0	N	0.8	1.5	0	0	N	0.8	1.5	0	0

TABLE C-12
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 37					LOCATION 37				LOCATION 37			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.2	1.9	2	3	NNE	1.4	2.3	10	14	NNE	1.4	2.1	10	11
NE	1.1	1.5	1	1	NE	2.0	2.8	72	46	NE	1.9	2.6	66	38
ENE	1.4	1.9	2	0	ENE	1.6	2.3	12	5	ENE	1.5	2.2	12	4
E	1.6	2.2	5	4	E	1.2	1.8	1	2	E	1.1	1.7	1	1
ESE	1.9	2.4	4	1	ESE	1.0	1.5	0	0	ESE	1.0	1.6	0	0
SE	1.8	2.4	0	4	SE	0.9	1.4	0	0	SE	0.9	1.5	0	0
SSE	1.4	2.1	0	1	SSE	0.9	1.5	0	0	SSE	1.0	1.6	0	0
S	1.1	1.8	0	0	S	1.2	1.8	0	1	S	1.2	1.8	1	1
SSW	1.1	1.8	0	1	SSW	1.5	2.1	1	13	SSW	1.5	2.1	4	17
SW	1.4	2.1	1	14	SW	1.3	1.9	0	12	SW	1.4	2.0	3	24
WSW	1.7	2.2	6	18	WSW	1.1	1.7	1	4	WSW	1.0	1.6	0	2
W	1.7	2.3	32	20	W	0.8	1.2	0	0	W	0.7	1.3	0	0
WNW	1.3	1.9	6	4	WNW	1.1	1.7	2	3	WNW	0.8	1.4	0	0
NW	1.9	2.5	40	27	NW	0.8	0.8	0	0	NW	0.8	1.2	0	0
NNW	1.5	2.0	1	2	NNW	0.9	1.2	0	0	NNW	0.7	1.2	0	0
N	1.2	1.8	0	0	N	0.9	1.5	0	0	N	1.0	1.6	0	0
LOCATION 38					LOCATION 38				LOCATION 38			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	0.9	1.6	1	2	NNE	1.2	1.9	9	9	NNE	1.2	1.8	8	8
NE	1.1	1.7	6	5	NE	1.0	1.6	9	6	NE	0.9	1.6	8	5
ENE	1.4	2.0	7	2	ENE	1.2	1.8	9	2	ENE	1.2	1.8	8	1
E	1.5	2.1	7	4	E	1.1	1.7	5	3	E	1.0	1.7	3	2
ESE	1.7	2.5	11	5	ESE	1.5	2.1	8	2	ESE	1.5	2.1	8	2
SE	2.0	2.5	2	7	SE	1.7	2.3	2	7	SE	1.7	2.3	2	6
SSE	1.9	2.4	2	4	SSE	1.8	2.4	4	5	SSE	1.8	2.3	3	4
S	1.2	1.8	1	1	S	1.5	2.1	9	11	S	1.5	2.1	8	8
SSW	1.1	1.7	0	3	SSW	1.4	1.9	5	17	SSW	1.5	2.1	11	24
SW	1.4	2.0	4	23	SW	1.2	1.7	2	15	SW	1.2	1.9	6	24
WSW	1.5	2.0	6	15	WSW	0.8	1.3	0	1	WSW	0.7	1.2	0	0
W	1.3	1.9	17	8	W	1.1	1.8	24	10	W	0.9	1.7	15	4
WNW	1.5	2.0	31	17	WNW	0.8	1.3	1	1	WNW	0.6	1.2	0	0
NW	1.3	1.8	3	3	NW	1.1	1.6	3	2	NW	1.2	1.8	13	6
NNW	1.2	1.7	0	1	NNW	1.3	1.8	3	3	NNW	1.2	1.7	2	2
N	1.1	1.7	0	0	N	1.3	1.8	4	3	N	1.2	1.7	2	2
LOCATION 39					LOCATION 39				LOCATION 39			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	0.6	1.1	0	0	NNE	1.5	2.2	12	11	NNE	1.5	2.1	10	8
NE	0.6	1.1	0	0	NE	1.6	2.4	50	26	NE	1.5	2.2	34	17
ENE	1.4	2.1	15	5	ENE	0.6	1.4	0	0	ENE	0.8	1.4	0	0
E	0.9	1.6	2	1	E	0.8	1.3	0	0	E	0.7	1.3	0	0
ESE	1.3	2.1	6	2	ESE	1.3	1.9	1	0	ESE	1.3	1.9	1	0
SE	1.9	2.5	3	9	SE	1.9	2.4	1	5	SE	1.9	2.5	2	6
SSE	1.9	2.4	3	5	SSE	1.9	2.5	2	4	SSE	2.0	2.6	3	4
S	1.3	1.9	3	4	S	1.8	2.3	7	9	S	1.7	2.4	9	9
SSW	1.0	1.6	0	3	SSW	1.7	2.2	8	21	SSW	1.8	2.4	16	31
SW	1.3	1.8	2	17	SW	1.4	2.0	3	16	SW	1.4	1.9	3	15
WSW	1.3	1.8	4	13	WSW	0.9	1.5	0	1	WSW	0.9	1.4	0	0
W	1.3	1.8	22	12	W	1.2	1.7	8	2	W	1.1	1.7	8	2
WNW	1.4	1.9	34	21	WNW	0.9	1.4	0	0	WNW	0.7	1.3	0	0
NW	1.2	1.7	5	5	NW	1.1	1.6	1	1	NW	1.3	1.8	7	4
NNW	1.1	1.6	0	1	NNW	1.3	1.8	1	1	NNW	1.3	1.9	2	2
N	1.0	1.5	0	0	N	1.3	1.9	1	1	N	1.3	1.8	1	1

TABLE C-13
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 40					LOCATION 40				LOCATION 40			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	0.8	1.3	0	1	NNE	1.0	1.6	1	2	NNE	0.9	1.5	1	2
NE	0.7	1.2	0	1	NE	1.3	2.2	23	19	NE	1.1	1.9	20	15
ENE	0.7	1.2	0	0	ENE	1.5	2.5	22	11	ENE	1.4	2.1	15	6
E	0.7	1.3	0	0	E	1.0	1.8	2	2	E	0.9	1.7	2	2
ESE	0.9	1.6	0	0	ESE	1.7	2.3	3	3	ESE	1.6	2.3	7	4
SE	1.7	2.2	2	6	SE	2.1	2.6	2	9	SE	2.1	2.7	5	12
SSE	1.8	2.4	3	5	SSE	2.0	2.8	4	8	SSE	2.0	2.8	5	9
S	1.5	2.0	6	7	S	1.4	2.2	3	7	S	1.4	2.2	7	12
SSW	1.2	1.7	1	7	SSW	0.5	1.1	0	0	SSW	0.4	1.1	0	0
SW	1.3	1.7	2	15	SW	0.8	1.3	0	0	SW	0.8	1.3	0	1
WSW	1.2	1.8	5	14	WSW	1.0	1.4	0	1	WSW	0.9	1.3	0	0
W	1.2	1.8	24	11	W	0.9	1.3	0	0	W	0.8	1.6	4	2
WNW	1.4	1.9	40	22	WNW	1.4	2.1	31	25	WNW	0.9	1.5	3	3
NW	1.3	1.8	14	9	NW	1.3	1.8	2	3	NW	1.4	1.9	16	14
NNW	1.0	1.5	0	0	NNW	1.5	2.1	3	7	NNW	1.5	2.1	6	10
N	0.9	1.3	0	0	N	1.4	2.0	2	4	N	1.5	2.1	6	7
LOCATION 41					LOCATION 41					LOCATION 41				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.6	2.2	20	15	NNE	1.0	1.6	0	1	NNE	1.0	1.6	1	3
NE	1.1	1.7	11	7	NE	0.8	1.8	2	3	NE	0.8	1.6	4	5
ENE	0.7	1.1	0	0	ENE	1.9	2.7	17	8	ENE	1.7	2.4	30	15
E	1.1	1.7	2	1	E	1.1	1.9	1	1	E	1.0	1.8	3	3
ESE	0.7	1.3	0	0	ESE	1.7	2.3	1	0	ESE	1.6	2.2	5	2
SE	1.6	2.2	1	4	SE	1.9	2.5	0	4	SE	1.8	2.4	2	7
SSE	1.8	2.4	3	4	SSE	1.1	2.0	0	0	SSE	1.2	2.0	0	2
S	1.7	2.2	9	10	S	0.9	1.4	0	0	S	0.8	1.3	0	0
SSW	1.5	2.1	7	18	SSW	1.0	1.7	0	0	SSW	1.1	1.7	0	6
SW	1.4	1.8	3	15	SW	0.9	1.5	0	0	SW	1.1	1.7	1	11
WSW	1.0	1.7	3	6	WSW	1.7	2.3	5	19	WSW	0.8	1.5	0	2
W	1.0	1.6	8	2	W	1.9	2.4	29	24	W	1.4	2.0	35	26
WNW	1.1	1.7	12	5	WNW	1.8	2.6	45	35	WNW	1.1	1.6	5	4
NW	1.1	1.6	3	2	NW	1.3	1.8	0	1	NW	1.1	1.7	4	5
NNW	1.4	1.8	3	3	NNW	1.5	2.1	0	1	NNW	1.4	1.9	3	6
N	1.6	2.2	11	7	N	1.6	2.1	1	1	N	1.5	2.0	3	4
LOCATION 42					LOCATION 42					LOCATION 42				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.5	2.1	10	8	NNE	0.8	1.6	0	0	NNE	0.8	1.4	0	1
NE	1.1	1.6	3	2	NE	1.5	2.4	8	10	NE	1.7	2.5	48	42
ENE	0.9	1.4	0	0	ENE	1.8	2.7	8	4	ENE	2.0	2.8	37	28
E	1.4	2.0	6	3	E	1.4	2.2	1	1	E	1.4	2.1	6	8
ESE	1.0	1.7	0	0	ESE	2.1	2.7	2	1	ESE	1.9	2.4	7	10
SE	1.7	2.2	1	3	SE	1.4	2.2	0	1	SE	1.5	2.1	0	5
SSE	1.6	2.2	1	1	SSE	0.8	1.3	0	0	SSE	0.7	1.3	0	0
S	1.7	2.3	7	7	S	1.0	1.5	0	0	S	0.9	1.4	0	0
SSW	1.6	2.2	8	16	SSW	0.8	1.2	0	0	SSW	0.6	1.0	0	0
SW	1.6	2.1	8	26	SW	0.6	1.1	0	0	SW	0.6	0.9	0	0
WSW	1.2	2.0	7	11	WSW	1.1	1.7	0	0	WSW	0.4	0.6	0	0
W	1.0	1.7	6	1	W	1.9	2.5	14	14	W	0.5	1.0	0	0
WNW	1.3	1.8	17	6	WNW	2.5	3.0	60	54	WNW	1.0	1.5	1	3
NW	1.2	1.8	6	3	NW	2.0	2.6	7	13	NW	1.0	1.4	0	0
NNW	1.4	2.0	3	3	NNW	1.3	2.1	0	0	NNW	0.7	1.2	0	0
N	1.8	2.4	14	8	N	1.0	1.7	0	0	N	1.0	1.7	0	1

TABLE C-14
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 43					LOCATION 43				LOCATION 43			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.2	1.7	1	2	NNE	0.9	1.8	12	14	NNE	1.2	1.9	10	14
NE	1.1	1.6	4	3	NE	0.1	1.3	2	2	NE	1.1	1.9	26	22
ENE	1.0	1.6	1	0	ENE	0.6	1.6	5	1	ENE	1.5	2.3	36	21
E	1.3	1.9	5	2	E	0.1	0.9	0	0	E	0.7	1.6	2	3
ESE	1.3	2.0	1	0	ESE	1.5	2.3	22	17	ESE	1.5	2.1	8	6
SE	1.7	2.2	1	3	SE	1.4	2.2	4	10	SE	1.2	2.0	1	6
SSE	1.6	2.2	1	1	SSE	0.9	1.6	0	1	SSE	0.9	1.5	0	1
S	1.6	2.2	4	4	S	0.7	1.3	0	0	S	0.5	1.1	0	0
SSW	1.4	2.0	3	9	SSW	1.0	1.4	0	2	SSW	0.9	1.4	0	1
SW	1.6	2.1	8	28	SW	0.6	0.9	0	0	SW	0.3	0.8	0	0
WSW	1.5	2.1	11	19	WSW	0.5	0.9	0	0	WSW	0.5	0.6	0	0
W	1.0	1.8	9	2	W	1.0	1.4	5	2	W	0.8	1.3	1	1
WNW	1.4	2.0	32	14	WNW	1.1	1.5	11	8	WNW	0.9	1.3	1	1
NW	1.4	2.0	12	6	NW	0.6	1.0	0	0	NW	0.4	0.8	0	0
NNW	1.4	1.9	2	2	NNW	1.1	1.6	1	3	NNW	0.9	1.4	0	1
N	1.4	2.1	6	4	N	1.8	2.4	38	33	N	1.6	2.2	16	19
LOCATION 44					LOCATION 44					LOCATION 44				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.2	1.8	2	4	NNE	1.4	2.2	32	27	NNE	1.2	1.9	29	29
NE	1.0	1.5	2	2	NE	0.8	1.6	11	10	NE	0.8	1.6	29	24
ENE	1.2	1.7	2	0	ENE	0.2	1.0	0	0	ENE	0.1	1.3	2	1
E	1.0	1.7	1	1	E	0.6	1.3	0	1	E	0.1	1.0	0	0
ESE	1.4	2.1	3	0	ESE	1.3	2.1	11	7	ESE	0.7	1.4	1	0
SE	1.8	2.3	1	4	SE	1.3	2.3	4	11	SE	0.7	1.5	0	3
SSE	1.6	2.1	1	1	SSE	0.8	1.5	0	1	SSE	0.8	1.5	0	1
S	1.5	2.1	3	3	S	0.4	0.9	0	0	S	0.1	0.8	0	0
SSW	1.3	1.9	1	5	SSW	0.6	1.1	0	0	SSW	0.7	1.1	0	1
SW	1.6	2.1	6	26	SW	0.5	1.0	0	0	SW	0.2	0.7	0	0
WSW	1.6	2.1	11	21	WSW	0.5	0.9	0	0	WSW	0.5	0.5	0	0
W	1.0	1.6	3	1	W	0.8	1.1	0	0	W	0.5	1.0	0	0
WNW	1.5	2.2	47	22	WNW	0.8	1.1	0	0	WNW	0.5	1.0	0	1
NW	1.5	2.0	13	7	NW	0.6	0.9	0	0	NW	0.4	0.7	0	0
NNW	1.4	1.9	2	2	NNW	1.1	1.7	2	4	NNW	0.8	1.3	0	1
N	1.1	1.7	0	0	N	1.9	2.5	40	35	N	1.6	2.2	39	40
LOCATION 45					LOCATION 45					LOCATION 45				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.5	2.1	13	10	NNE	1.1	1.7	3	6	NNE	1.2	1.7	3	5
NE	1.4	2.0	26	13	NE	0.7	1.3	1	2	NE	0.8	1.4	1	2
ENE	1.0	1.6	2	0	ENE	1.5	2.5	43	22	ENE	1.4	2.3	27	11
E	0.9	1.6	2	1	E	1.2	2.0	9	7	E	1.3	1.9	7	4
ESE	0.8	1.4	0	0	ESE	1.6	2.2	10	6	ESE	1.5	2.2	6	2
SE	1.4	1.9	0	2	SE	1.8	2.4	3	10	SE	1.8	2.4	2	7
SSE	1.6	2.1	1	2	SSE	1.0	1.7	0	1	SSE	0.8	1.6	0	0
S	1.6	2.2	7	6	S	0.9	1.6	1	1	S	0.8	1.4	0	0
SSW	1.7	2.2	12	23	SSW	0.9	1.5	0	2	SSW	0.9	1.6	0	2
SW	1.6	2.0	10	29	SW	0.8	1.1	0	0	SW	0.6	1.1	0	0
WSW	1.0	1.6	1	2	WSW	1.2	1.8	4	16	WSW	1.5	2.1	14	36
W	1.1	1.6	7	1	W	0.9	1.4	2	1	W	1.3	1.9	26	15
WNW	1.0	1.5	4	1	WNW	1.0	1.4	2	2	WNW	1.0	1.5	4	3
NW	1.0	1.5	1	0	NW	1.1	1.6	3	4	NW	0.9	1.5	0	1
NNW	1.2	1.7	1	1	NNW	1.3	1.9	4	8	NNW	1.4	1.9	3	5
N	1.7	2.3	14	8	N	1.6	2.1	9	10	N	1.5	2.0	5	5

TABLE C-15
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 46					LOCATION 46				LOCATION 46			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	0.9	1.5	1	2	NNE	1.1	1.8	1	5	NNE	1.0	1.6	22	24
NE	1.3	1.8	27	13	NE	1.2	1.9	8	10	NE	1.0	1.5	34	27
ENE	1.3	1.9	18	3	ENE	1.4	2.3	13	7	ENE	0.6	1.3	6	2
E	1.0	1.6	3	2	E	1.7	2.4	15	12	E	0.9	1.6	18	14
ESE	0.9	1.4	0	0	ESE	1.8	2.5	8	7	ESE	0.8	1.4	2	1
SE	1.3	1.8	0	2	SE	1.4	2.0	0	2	SE	0.6	1.0	0	1
SSE	1.4	1.9	1	1	SSE	0.5	1.0	0	0	SSE	0.2	0.9	0	0
S	1.5	2.0	7	6	S	0.6	1.0	0	0	S	0.3	0.8	0	0
SSW	1.6	2.0	15	27	SSW	0.6	0.8	0	0	SSW	0.4	0.8	0	0
SW	1.3	2.0	18	41	SW	0.5	0.9	0	0	SW	0.5	0.5	0	0
WSW	0.6	1.3	0	0	WSW	0.9	1.4	0	0	WSW	0.1	0.7	0	0
W	1.0	1.4	6	1	W	1.4	2.0	22	19	W	0.3	0.8	0	0
WNW	0.7	1.2	0	0	WNW	1.3	2.0	19	18	WNW	0.2	0.6	0	0
NW	0.7	1.2	0	0	NW	1.2	2.1	12	16	NW	0.5	1.0	0	1
NNW	1.1	1.5	1	1	NNW	1.1	1.7	0	1	NNW	0.9	1.4	4	10
N	1.1	1.5	1	1	N	1.3	2.0	2	4	N	0.9	1.6	14	17
LOCATION 47					LOCATION 47					LOCATION 47				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.6	2.1	10	8	NNE	1.8	2.4	13	18	NNE	1.4	2.0	5	9
NE	1.5	2.0	20	10	NE	1.5	2.3	25	22	NE	1.4	2.0	18	16
ENE	1.2	1.7	2	0	ENE	1.7	2.7	29	17	ENE	1.4	2.3	16	7
E	1.4	2.1	9	4	E	1.3	2.2	5	5	E	1.2	2.0	5	5
ESE	1.0	1.6	0	0	ESE	1.8	2.5	7	6	ESE	1.5	2.2	3	2
SE	1.6	2.2	0	3	SE	1.5	2.1	0	3	SE	1.3	1.9	0	2
SSE	1.7	2.3	1	2	SSE	0.8	1.5	0	0	SSE	0.5	1.2	0	0
S	1.7	2.3	7	6	S	0.9	1.7	0	0	S	0.6	1.3	0	0
SSW	1.8	2.4	15	27	SSW	0.8	1.2	0	0	SSW	0.8	1.2	0	0
SW	1.6	2.2	12	31	SW	0.7	1.0	0	0	SW	0.6	0.9	0	0
WSW	1.0	1.6	1	1	WSW	1.2	1.7	0	3	WSW	1.5	1.9	4	18
W	1.1	1.6	3	0	W	1.1	1.8	4	3	W	1.6	2.1	36	29
WNW	1.1	1.7	5	2	WNW	1.2	1.8	6	8	WNW	1.3	1.8	13	11
NW	1.2	1.7	3	1	NW	1.0	1.5	0	0	NW	0.7	1.2	0	0
NNW	1.3	1.8	0	0	NNW	1.2	1.7	0	1	NNW	0.7	1.1	0	0
N	1.8	2.3	10	5	N	1.8	2.4	8	11	N	1.1	1.8	1	1
LOCATION 48					LOCATION 48					LOCATION 48				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.5	2.0	9	7	NNE	1.5	2.0	2	5	NNE	0.4	0.9	0	0
NE	1.5	2.0	23	11	NE	1.8	2.5	25	22	NE	0.4	1.2	1	3
ENE	1.1	1.6	1	0	ENE	1.9	2.8	24	14	ENE	0.5	1.3	1	0
E	1.5	2.1	8	3	E	2.1	2.9	22	17	E	0.6	1.2	0	1
ESE	1.0	1.6	0	0	ESE	2.5	3.2	21	27	ESE	0.8	1.3	0	0
SE	1.5	2.0	0	2	SE	1.3	2.1	0	2	SE	0.6	1.0	0	0
SSE	1.6	2.2	1	1	SSE	0.7	1.3	0	0	SSE	0.1	1.3	0	0
S	1.5	2.0	3	2	S	0.7	1.3	0	0	S	0.1	1.1	0	0
SSW	1.8	2.3	14	24	SSW	1.0	1.5	0	0	SSW	0.5	0.9	0	0
SW	1.6	2.2	16	37	SW	0.6	0.8	0	0	SW	0.4	0.4	0	0
WSW	0.9	1.7	2	3	WSW	1.2	1.6	0	1	WSW	1.0	1.5	4	18
W	0.9	1.5	2	0	W	1.2	1.7	1	1	W	1.1	1.7	32	27
WNW	1.1	1.6	5	1	WNW	1.4	1.9	4	5	WNW	1.2	1.8	52	42
NW	1.1	1.7	2	1	NW	1.4	1.9	1	3	NW	0.9	1.5	9	11
NNW	1.4	1.9	2	2	NNW	1.0	1.5	0	0	NNW	0.8	1.3	0	0
N	1.7	2.2	8	4	N	0.9	1.3	0	0	N	0.5	1.1	0	0

TABLE C-16
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 49					LOCATION 49				LOCATION 49			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.6	2.1	9	7	NNE	1.5	2.0	3	8	NNE	0.6	1.0	0	0
NE	1.5	2.0	21	11	NE	1.7	2.4	32	28	NE	0.6	1.0	0	1
ENE	1.1	1.7	2	0	ENE	1.5	2.5	23	14	ENE	0.7	1.2	0	0
E	1.5	2.1	8	4	E	1.6	2.5	19	16	E	0.7	1.2	0	1
ESE	1.1	1.7	0	0	ESE	1.3	2.3	3	3	ESE	0.7	1.4	0	0
SE	1.5	2.0	0	2	SE	0.9	1.4	0	0	SE	0.5	1.1	0	0
SSE	1.6	2.2	1	1	SSE	0.8	1.3	0	0	SSE	0.5	1.1	0	0
S	1.5	2.1	3	2	S	0.8	1.4	0	0	S	1.0	1.5	1	2
SSW	1.9	2.3	13	25	SSW	0.7	1.3	0	0	SSW	0.6	1.1	0	0
SW	1.7	2.2	12	32	SW	0.5	0.9	0	0	SW	0.2	0.2	0	0
WSW	1.0	1.8	2	3	WSW	1.0	1.5	0	1	WSW	1.1	1.6	3	14
W	0.9	1.4	1	0	W	1.0	1.6	1	1	W	1.2	1.6	18	14
WNW	1.3	1.9	20	8	WNW	1.3	1.7	5	7	WNW	1.3	1.7	25	22
NW	1.1	1.6	1	0	NW	1.6	2.1	13	19	NW	1.5	2.0	52	43
NNW	1.0	1.5	0	0	NNW	1.1	1.6	0	1	NNW	1.0	1.5	1	2
N	1.7	2.2	7	4	N	1.2	1.6	0	0	N	1.0	1.6	1	2
LOCATION 50					LOCATION 50					LOCATION 50				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.4	2.0	5	4	NNE	1.5	2.0	3	7	NNE	1.1	1.6	2	5
NE	1.4	1.9	15	6	NE	1.6	2.2	19	18	NE	1.0	1.5	5	6
ENE	1.1	1.6	1	0	ENE	1.8	2.6	24	15	ENE	1.0	1.7	6	2
E	1.4	2.0	5	2	E	1.9	2.8	28	21	E	1.3	2.0	12	9
ESE	1.2	1.7	0	0	ESE	1.5	2.1	1	1	ESE	1.2	1.9	4	2
SE	1.3	1.8	0	1	SE	0.8	1.3	0	0	SE	0.6	1.2	0	0
SSE	1.5	2.0	0	1	SSE	1.0	1.7	0	0	SSE	0.8	1.5	0	0
S	1.3	1.9	2	0	S	1.2	2.0	1	3	S	1.2	2.0	6	11
SSW	2.0	2.5	22	27	SSW	0.9	1.3	0	0	SSW	0.2	0.8	0	0
SW	2.0	2.5	35	52	SW	0.6	1.1	0	0	SW	0.1	0.6	0	0
WSW	1.2	2.0	5	6	WSW	1.1	1.7	0	5	WSW	1.0	1.6	2	10
W	0.9	1.3	0	0	W	1.1	1.8	6	5	W	1.0	1.6	12	8
WNW	1.1	1.6	4	1	WNW	1.1	1.6	2	3	WNW	1.1	1.7	17	14
NW	1.2	1.8	5	1	NW	1.5	2.2	15	21	NW	1.3	1.9	30	26
NNW	1.0	1.4	0	0	NNW	0.9	1.4	0	0	NNW	1.0	1.5	0	1
N	1.3	1.8	1	0	N	1.4	1.8	1	1	N	1.3	1.9	5	6
LOCATION 51					LOCATION 51					LOCATION 51				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.7	2.2	12	10	NNE	1.8	2.5	2	6	NNE	1.2	1.6	1	3
NE	1.3	1.8	10	6	NE	1.6	2.8	20	17	NE	1.1	1.7	5	7
ENE	0.9	1.4	0	0	ENE	1.3	2.5	3	1	ENE	1.0	1.6	1	0
E	1.5	2.1	7	3	E	1.5	2.7	4	4	E	1.2	1.8	2	3
ESE	1.1	1.8	0	0	ESE	0.6	1.0	0	0	ESE	0.6	1.0	0	0
SE	1.6	2.1	0	2	SE	0.5	1.0	0	0	SE	0.5	0.8	0	0
SSE	1.6	2.2	1	1	SSE	0.5	0.9	0	0	SSE	0.3	0.6	0	0
S	1.6	2.2	4	3	S	0.8	1.3	0	0	S	0.6	0.9	0	0
SSW	1.7	2.3	9	19	SSW	0.6	0.8	0	0	SSW	0.1	0.6	0	0
SW	1.7	2.2	9	27	SW	0.6	1.1	0	0	SW	0.1	0.6	0	0
WSW	1.3	2.0	5	9	WSW	1.9	2.5	2	12	WSW	0.8	1.4	0	1
W	1.0	1.7	6	1	W	2.2	2.9	32	28	W	1.6	2.1	23	23
WNW	1.2	1.9	15	6	WNW	2.2	2.9	37	31	WNW	1.9	2.3	65	56
NW	1.2	1.8	3	2	NW	1.0	1.8	0	0	NW	1.4	1.9	4	8
NNW	1.4	2.0	4	3	NNW	1.1	1.8	0	0	NNW	0.4	0.8	0	0
N	1.9	2.4	13	7	N	1.3	1.8	0	0	N	1.2	1.6	0	0

TABLE C-17
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES				
LOCATION 52					LOCATION 52				LOCATION 52				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.5	2.1	8	6	NNE	1.1	1.6	0	1	NNE	1.2	1.9	3	6
NE	1.3	1.8	9	4	NE	1.0	1.5	0	1	NE	0.9	1.5	2	3
ENE	1.1	1.6	1	0	ENE	1.1	1.6	0	0	ENE	1.3	1.8	2	1
E	1.4	2.0	6	2	E	0.9	1.5	0	0	E	1.3	1.8	2	2
ESE	1.2	1.8	0	0	ESE	0.8	1.3	0	0	ESE	0.8	1.2	0	0
SE	1.5	2.0	0	1	SE	0.7	1.1	0	0	SE	0.6	1.0	0	0
SSE	1.6	2.1	1	1	SSE	0.9	1.4	0	0	SSE	0.3	0.7	0	0
S	1.5	2.1	3	2	S	1.0	1.6	0	0	S	0.7	1.0	0	0
SSW	1.9	2.3	10	17	SSW	0.8	1.1	0	0	SSW	0.1	0.6	0	0
SW	1.8	2.3	18	38	SW	0.5	0.9	0	0	SW	0.1	1.2	0	0
WSW	1.5	2.2	12	17	WSW	1.7	2.3	7	25	WSW	1.4	2.0	6	20
W	0.7	1.2	0	0	W	1.7	2.4	32	24	W	1.4	2.2	36	27
WNW	1.4	2.0	22	7	WNW	1.7	2.4	32	24	WNW	1.4	2.0	25	19
NW	1.4	1.9	6	2	NW	1.8	2.5	30	26	NW	1.6	2.2	25	22
NNW	1.2	1.7	0	0	NNW	1.4	2.0	0	1	NNW	1.1	1.7	0	1
N	1.6	2.1	5	2	N	1.3	1.8	0	0	N	1.1	1.7	0	1
LOCATION 53					LOCATION 53					LOCATION 53				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.4	2.0	1	2	NNE	1.0	1.5	0	1	NNE	0.1	0.2	0	0
NE	1.9	2.5	27	12	NE	1.3	1.8	10	7	NE	0.3	0.8	0	0
ENE	1.8	2.5	11	2	ENE	1.0	1.6	2	0	ENE	0.2	0.7	0	0
E	2.1	2.8	21	8	E	1.4	2.3	16	8	E	0.5	0.9	0	0
ESE	1.2	1.6	0	0	ESE	0.9	1.5	0	0	ESE	0.4	1.0	0	0
SE	1.0	1.3	0	0	SE	1.0	1.6	0	1	SE	0.6	1.2	0	1
SSE	0.9	1.4	0	0	SSE	1.1	1.6	0	0	SSE	1.0	1.7	2	3
S	1.1	1.7	0	0	S	1.1	1.6	0	0	S	1.0	1.6	7	8
SSW	2.0	2.4	3	8	SSW	1.6	2.1	7	21	SSW	0.9	1.6	9	24
SW	2.1	2.8	23	47	SW	1.0	1.5	0	2	SW	0.1	0.9	0	0
WSW	1.8	2.6	14	22	WSW	1.4	2.2	14	32	WSW	0.9	1.5	15	30
W	0.7	1.4	0	0	W	1.4	2.0	34	17	W	1.0	1.5	47	23
WNW	0.5	1.1	0	0	WNW	1.1	1.7	9	5	WNW	0.8	1.3	17	8
NW	0.7	1.0	0	0	NW	1.1	1.8	4	3	NW	0.7	1.2	4	2
NNW	0.8	1.3	0	0	NNW	1.0	1.6	0	0	NNW	0.5	0.9	0	0
N	1.1	1.7	0	0	N	1.1	1.8	1	1	N	0.5	0.7	0	0
LOCATION 54					LOCATION 54					LOCATION 54				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.1	1.8	1	2	NNE	1.3	1.8	0	1	NNE	0.6	1.1	0	0
NE	1.8	2.3	24	15	NE	0.8	1.4	0	0	NE	0.6	1.1	0	0
ENE	1.8	2.4	14	4	ENE	2.2	2.9	8	4	ENE	0.9	1.4	0	0
E	1.7	2.2	6	4	E	2.2	3.0	9	8	E	1.4	1.9	1	2
ESE	1.7	2.2	2	0	ESE	2.4	3.1	4	3	ESE	0.1	0.8	0	0
SE	1.6	2.1	0	2	SE	1.9	2.4	0	2	SE	0.1	0.2	0	0
SSE	1.0	1.5	0	0	SSE	1.4	2.0	0	0	SSE	0.1	0.6	0	0
S	1.0	1.7	0	0	S	1.1	1.9	0	0	S	0.7	1.2	0	0
SSW	1.7	2.1	2	8	SSW	1.2	2.0	0	1	SSW	0.5	1.0	0	0
SW	1.7	2.2	4	24	SW	1.0	1.6	0	0	SW	0.1	0.2	0	0
WSW	1.7	2.3	9	20	WSW	1.4	2.1	0	2	WSW	0.1	0.6	0	0
W	1.6	2.1	21	9	W	2.0	2.6	14	13	W	1.1	1.8	4	3
WNW	1.5	2.0	15	8	WNW	2.4	3.1	58	51	WNW	1.6	2.4	45	38
NW	1.3	1.9	2	2	NW	1.7	2.5	3	6	NW	1.6	2.3	21	23
NNW	1.3	1.9	0	1	NNW	2.1	2.8	3	9	NNW	2.1	2.8	30	36
N	1.0	1.6	0	0	N	1.1	1.9	0	0	N	1.0	1.7	0	0

TABLE C-18
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 55					LOCATION 55				LOCATION 55			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.0	1.5	0	1	NNE	1.6	2.1	3	6	NNE	0.5	0.9	0	0
NE	1.6	2.1	18	11	NE	0.8	1.3	0	0	NE	0.3	0.7	0	0
ENE	1.7	2.3	12	3	ENE	1.1	1.9	1	0	ENE	0.7	1.3	2	0
E	1.6	2.1	4	3	E	0.9	2.0	1	1	E	1.0	1.6	8	2
ESE	1.6	2.1	1	0	ESE	0.8	1.2	0	0	ESE	0.7	0.9	0	0
SE	1.4	2.0	0	1	SE	0.7	1.0	0	0	SE	0.3	0.7	0	0
SSE	1.1	1.6	0	0	SSE	0.6	1.0	0	0	SSE	0.5	0.8	0	0
S	1.3	1.8	0	0	S	1.0	1.5	0	0	S	0.3	0.8	0	0
SSW	1.6	2.0	1	6	SSW	1.1	2.0	0	4	SSW	1.4	2.2	66	66
SW	1.7	2.2	4	23	SW	1.3	2.1	1	13	SW	1.0	1.7	12	22
WSW	1.6	2.2	8	20	WSW	1.5	2.2	5	15	WSW	1.0	1.6	10	11
W	1.6	2.2	29	14	W	1.4	2.2	18	10	W	0.5	1.0	0	0
WNW	1.4	2.0	13	7	WNW	1.9	2.6	63	41	WNW	0.5	1.0	0	0
NW	1.2	1.8	1	1	NW	1.3	2.2	7	7	NW	0.6	1.1	0	0
NNW	1.7	2.3	8	8	NNW	1.2	2.0	0	1	NNW	0.8	1.4	1	1
N	1.2	1.8	0	0	N	1.0	1.7	0	0	N	0.6	1.2	0	0
LOCATION 56					LOCATION 56					LOCATION 56				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.2	1.8	2	3	NNE	1.2	1.7	12	11	NNE	0.5	1.0	0	1
NE	1.5	2.1	16	11	NE	0.7	1.0	0	1	NE	0.3	0.7	0	0
ENE	1.9	2.4	18	6	ENE	0.9	1.5	4	1	ENE	0.1	0.7	0	0
E	1.5	2.0	4	3	E	0.5	0.8	0	0	E	0.4	0.7	0	0
ESE	1.3	1.8	0	0	ESE	0.7	1.0	0	0	ESE	0.6	0.9	0	0
SE	0.9	1.4	0	0	SE	0.5	0.9	0	0	SE	0.4	0.7	0	0
SSE	1.1	1.7	0	0	SSE	0.1	0.8	0	0	SSE	0.1	0.6	0	0
S	1.5	2.0	1	1	S	0.5	0.9	0	0	S	0.6	1.1	0	0
SSW	1.6	2.1	2	10	SSW	0.9	1.3	0	2	SSW	0.8	1.2	1	8
SW	1.7	2.2	5	26	SW	1.2	1.7	11	40	SW	0.8	1.3	6	28
WSW	1.4	2.0	4	11	WSW	0.8	1.3	1	4	WSW	0.3	1.0	0	1
W	1.4	2.0	18	8	W	0.8	1.4	13	4	W	0.6	1.1	7	3
WNW	1.6	2.0	21	11	WNW	1.1	1.6	32	17	WNW	0.8	1.3	30	17
NW	1.1	1.6	0	1	NW	1.1	1.6	20	12	NW	0.9	1.4	40	24
NNW	1.5	2.1	3	4	NNW	1.1	1.7	6	6	NNW	1.0	1.5	16	15
N	1.6	2.1	3	3	N	0.8	1.4	1	1	N	0.6	1.3	2	2
LOCATION 57					LOCATION 57					LOCATION 57				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.2	1.8	1	2	NNE	1.3	1.9	2	2	NNE	0.6	0.9	0	0
NE	1.2	1.8	6	4	NE	0.8	1.3	0	0	NE	0.4	0.7	0	0
ENE	1.6	2.1	9	2	ENE	0.9	1.5	0	0	ENE	0.6	0.9	0	0
E	1.5	2.0	4	2	E	0.9	1.5	0	0	E	0.7	1.1	0	0
ESE	1.4	1.9	1	0	ESE	0.7	1.2	0	0	ESE	0.4	0.8	0	0
SE	1.0	1.5	0	0	SE	1.0	1.5	0	0	SE	0.3	0.6	0	0
SSE	1.2	1.8	0	0	SSE	0.8	1.2	0	0	SSE	0.4	0.8	0	0
S	1.6	2.2	4	3	S	1.0	1.5	0	0	S	0.9	1.4	0	0
SSW	1.7	2.2	4	12	SSW	1.6	2.3	2	7	SSW	1.3	1.9	1	11
SW	1.8	2.3	12	36	SW	1.8	2.6	20	46	SW	0.9	1.5	0	4
WSW	1.5	2.1	8	16	WSW	1.5	2.4	11	19	WSW	0.8	1.4	0	1
W	1.5	2.1	23	10	W	1.3	2.2	21	6	W	0.6	1.3	0	0
WNW	1.5	2.0	18	8	WNW	1.6	2.3	30	12	WNW	1.5	2.1	53	38
NW	0.9	1.5	0	0	NW	1.4	2.2	14	7	NW	1.5	2.1	33	28
NNW	1.4	1.9	1	1	NNW	1.3	1.9	0	0	NNW	1.5	2.2	10	15
N	1.5	2.1	3	2	N	1.0	1.6	0	0	N	1.4	2.0	4	5

TABLE C-19
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 58					LOCATION 58				LOCATION 58			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.2	1.8	6	6	NNE	1.0	1.6	0	0	NNE	0.6	1.0	0	0
NE	0.9	1.4	3	2	NE	0.9	1.4	0	0	NE	0.6	0.9	0	0
ENE	1.3	1.9	10	2	ENE	1.2	1.9	3	0	ENE	0.2	0.7	0	0
E	1.6	2.2	18	8	E	1.2	2.0	3	1	E	0.5	1.0	0	0
ESE	1.4	1.8	1	0	ESE	0.9	1.6	0	0	ESE	0.7	1.3	0	0
SE	1.2	1.7	0	1	SE	0.9	1.4	0	0	SE	0.6	1.1	0	0
SSE	1.1	1.7	0	0	SSE	0.9	1.5	0	0	SSE	0.6	1.1	0	0
S	1.4	1.9	3	3	S	1.2	1.9	1	0	S	1.0	1.6	1	0
SSW	1.5	2.0	4	13	SSW	1.9	2.9	43	44	SSW	1.8	2.6	75	68
SW	1.4	1.9	4	19	SW	1.9	2.7	36	48	SW	1.3	2.1	24	32
WSW	1.4	2.0	14	27	WSW	1.4	2.2	8	7	WSW	0.7	1.4	0	0
W	1.2	1.8	20	7	W	1.1	1.7	4	0	W	0.8	1.3	2	0
WNW	0.9	1.3	1	0	WNW	1.0	1.5	1	0	WNW	0.7	1.1	0	0
NW	0.7	1.3	0	0	NW	0.7	1.2	0	0	NW	0.6	1.1	0	0
NNW	1.3	1.9	4	4	NNW	1.1	1.7	0	0	NNW	0.8	1.2	0	0
N	1.5	2.1	9	6	N	1.2	1.8	1	0	N	0.7	1.1	0	0
LOCATION 59					LOCATION 59					LOCATION 59				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	0.6	1.2	0	0	NNE	0.8	1.4	0	0	NNE	0.5	0.9	0	0
NE	0.8	1.4	1	2	NE	0.8	1.3	0	0	NE	0.5	0.8	0	0
ENE	1.3	2.0	10	2	ENE	1.6	2.5	11	1	ENE	0.4	1.0	0	0
E	1.9	2.5	28	14	E	1.5	2.3	4	1	E	0.6	1.4	2	1
ESE	1.7	2.2	5	1	ESE	0.8	1.5	0	0	ESE	0.7	1.3	0	0
SE	1.6	2.2	0	4	SE	0.9	1.2	0	0	SE	0.6	1.0	0	0
SSE	1.2	1.7	0	0	SSE	0.8	1.4	0	0	SSE	0.7	1.2	0	0
S	1.3	1.9	2	2	S	1.1	1.9	0	0	S	1.0	1.6	2	1
SSW	1.4	1.9	1	8	SSW	2.0	3.0	25	29	SSW	1.6	2.4	83	81
SW	1.4	1.9	2	15	SW	2.2	3.1	48	64	SW	0.9	1.7	10	18
WSW	1.5	2.2	14	31	WSW	1.6	2.2	4	4	WSW	0.7	1.2	0	0
W	1.2	1.9	16	6	W	1.4	2.0	6	0	W	0.6	1.2	1	0
WNW	1.1	1.6	3	2	WNW	1.3	1.9	3	1	WNW	0.5	1.0	0	0
NW	1.0	1.5	0	0	NW	0.7	1.3	0	0	NW	0.6	1.0	0	0
NNW	1.6	2.2	14	13	NNW	1.0	1.5	0	0	NNW	0.9	1.4	1	0
N	1.0	1.6	0	0	N	0.9	1.5	0	0	N	0.8	1.4	1	0
LOCATION 60					LOCATION 60					LOCATION 60				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT SPR	SUM
NNE	1.5	2.1	7	5	NNE	1.3	1.8	1	3	NNE	1.5	2.0	8	12
NE	1.5	2.0	16	7	NE	1.0	1.6	2	3	NE	1.1	1.6	5	6
ENE	1.3	1.9	5	0	ENE	1.7	2.2	9	3	ENE	1.6	2.2	14	6
E	1.4	2.0	5	2	E	1.9	2.4	11	8	E	1.7	2.2	12	9
ESE	1.3	1.9	1	0	ESE	1.4	1.9	0	0	ESE	1.1	1.7	0	0
SE	1.4	1.9	0	1	SE	0.9	1.4	0	0	SE	0.5	0.9	0	0
SSE	1.5	2.0	0	1	SSE	0.8	1.3	0	0	SSE	0.7	1.2	0	0
S	1.2	1.8	1	0	S	0.9	1.5	0	0	S	0.7	1.4	0	0
SSW	1.7	2.3	7	13	SSW	0.6	0.6	0	0	SSW	0.6	1.0	0	0
SW	1.9	2.4	19	37	SW	0.7	1.1	0	0	SW	0.3	0.8	0	0
WSW	1.8	2.4	21	29	WSW	1.7	2.3	11	32	WSW	1.3	1.9	6	21
W	0.8	1.4	1	0	W	1.7	2.3	40	30	W	1.4	2.0	29	22
WNW	1.1	1.7	5	1	WNW	1.4	2.1	18	14	WNW	1.2	1.8	12	10
NW	1.3	1.9	8	3	NW	0.6	1.5	0	0	NW	0.7	1.4	0	0
NNW	0.9	1.5	0	0	NNW	0.9	1.6	0	0	NNW	0.8	1.5	0	0
N	1.4	2.1	3	1	N	1.7	2.4	7	8	N	1.8	2.4	15	15

TABLE C-20
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 1					LOCATION 1				LOCATION 1			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.5	2.7	7	4	NNE	1.8	3.0	3	1	NNE	0.3	1.2	0	0
NE	1.4	2.6	18	9	NE	0.9	2.0	1	0	NE	0.2	1.2	0	0
ENE	1.7	2.8	14	10	ENE	1.1	2.3	1	0	ENE	0.1	1.1	0	0
E	1.4	2.6	5	3	E	0.8	1.9	0	0	E	0.1	1.2	0	0
ESE	1.2	2.3	1	0	ESE	0.8	1.8	0	0	ESE	0.1	1.2	0	0
SE	0.9	2.1	0	0	SE	0.9	2.1	0	0	SE	0.5	1.7	0	0
SSE	1.2	2.5	0	0	SSE	1.3	2.6	0	0	SSE	1.0	1.9	0	0
S	1.6	2.6	2	2	S	2.2	3.4	3	2	S	1.4	2.4	2	2
SSW	1.7	2.6	4	2	SSW	2.4	3.7	10	4	SSW	1.7	2.7	11	5
SW	1.8	2.7	12	6	SW	2.1	3.4	11	4	SW	1.8	3.0	41	25
WSW	1.3	2.7	5	6	WSW	1.6	3.4	5	4	WSW	1.5	2.7	13	14
W	1.1	2.7	17	31	W	1.3	3.6	24	35	W	1.3	2.4	11	19
WNW	1.3	2.4	6	12	WNW	1.5	2.9	4	5	WNW	1.3	2.4	11	24
NW	1.1	2.2	4	3	NW	2.0	3.4	17	16	NW	0.7	2.3	10	11
NNW	1.2	2.4	1	1	NNW	2.5	4.0	16	16	NNW	0.1	1.7	0	0
N	1.5	2.7	3	10	N	2.3	3.7	6	13	N	0.5	1.3	0	0
LOCATION 2					LOCATION 2					LOCATION 2				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.5	2.5	3	1	NNE	0.6	1.4	0	0	NNE	0.4	1.3	0	0
NE	1.6	2.8	20	9	NE	0.3	1.2	0	0	NE	0.1	1.3	2	0
ENE	1.8	2.8	9	6	ENE	0.4	1.3	0	0	ENE	0.1	1.2	0	0
E	1.4	2.6	4	2	E	0.5	1.3	0	0	E	0.1	1.6	1	0
ESE	1.0	2.3	1	0	ESE	0.7	1.6	0	0	ESE	0.3	1.4	0	0
SE	0.8	2.0	0	0	SE	1.1	2.5	1	0	SE	0.1	1.4	0	0
SSE	1.2	2.4	0	0	SSE	1.1	2.6	0	0	SSE	0.5	1.5	0	0
S	1.6	2.7	2	1	S	1.2	2.5	3	1	S	0.6	1.5	0	0
SSW	1.8	2.7	4	1	SSW	0.9	2.0	1	0	SSW	0.8	1.9	3	1
SW	1.9	2.7	7	3	SW	0.1	2.0	1	0	SW	0.8	2.3	28	14
WSW	1.3	2.5	2	1	WSW	0.2	2.3	2	1	WSW	0.9	2.5	32	32
W	1.5	3.0	24	37	W	0.4	2.4	12	8	W	0.8	2.2	26	42
WNW	1.6	2.8	15	27	WNW	1.7	3.0	59	76	WNW	0.1	1.8	4	6
NW	1.3	2.3	4	2	NW	1.1	2.6	22	14	NW	0.1	1.7	5	3
NNW	1.4	2.5	1	1	NNW	0.9	1.9	0	0	NNW	0.4	1.6	0	0
N	1.7	2.9	3	8	N	0.5	1.4	0	0	N	0.4	1.4	0	0
LOCATION 3					LOCATION 3					LOCATION 3				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.5	2.7	5	2	NNE	1.0	2.2	0	0	NNE	0.2	1.6	0	0
NE	1.7	2.7	17	8	NE	0.2	1.6	0	0	NE	0.2	1.6	1	0
ENE	1.4	2.6	6	3	ENE	0.5	1.9	0	0	ENE	0.1	1.3	0	0
E	1.6	2.8	5	3	E	1.3	2.4	1	0	E	0.1	1.3	0	0
ESE	0.8	2.1	0	0	ESE	1.5	3.0	2	0	ESE	0.4	1.5	0	0
SE	0.7	1.8	0	0	SE	1.6	3.2	1	0	SE	0.1	1.8	0	0
SSE	1.1	2.3	0	0	SSE	1.1	2.5	0	0	SSE	0.3	2.1	0	0
S	1.5	2.6	2	1	S	1.0	2.6	1	0	S	0.7	2.0	0	0
SSW	1.9	2.8	5	2	SSW	0.9	2.6	1	0	SSW	0.9	2.1	1	0
SW	1.9	2.8	9	4	SW	1.8	3.2	10	2	SW	1.3	2.8	16	5
WSW	1.3	2.7	3	3	WSW	1.7	3.4	9	5	WSW	1.5	3.3	32	25
W	1.6	3.1	28	43	W	2.0	3.6	33	38	W	1.4	3.3	51	70
WNW	1.6	2.7	12	21	WNW	2.3	3.6	37	52	WNW	0.5	1.7	0	0
NW	1.2	2.3	3	1	NW	1.3	2.8	7	3	NW	0.1	1.8	0	0
NNW	1.5	2.7	2	1	NNW	1.0	2.0	0	0	NNW	0.7	1.6	0	0
N	1.7	2.8	3	7	N	1.0	2.0	0	0	N	0.3	1.3	0	0

TABLE C-21
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 4					LOCATION 4				LOCATION 4			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.6	2.9	13	8	NNE	0.9	2.5	4	1	NNE	0.7	2.2	2	0
NE	0.8	2.1	7	2	NE	0.7	2.0	5	1	NE	0.6	1.9	4	1
ENE	0.6	1.8	1	0	ENE	0.6	1.9	1	0	ENE	0.7	2.1	2	1
E	0.8	1.7	0	0	E	0.9	2.3	2	1	E	1.0	2.3	2	1
ESE	0.9	1.9	0	0	ESE	1.2	2.3	1	0	ESE	1.3	2.3	1	0
SE	0.8	1.9	0	0	SE	1.1	2.1	0	0	SE	1.2	2.1	0	0
SSE	1.2	2.6	0	0	SSE	0.7	2.0	0	0	SSE	1.0	2.3	0	0
S	1.7	3.0	6	5	S	1.3	2.5	2	1	S	1.1	2.4	1	1
SSW	2.0	3.0	15	7	SSW	1.6	2.5	3	1	SSW	1.4	2.4	3	1
SW	1.7	2.6	10	4	SW	1.4	2.4	4	1	SW	1.3	2.3	3	0
WSW	1.2	2.3	1	1	WSW	1.0	2.4	1	0	WSW	1.2	2.3	1	0
W	1.1	2.3	3	5	W	1.3	3.0	32	38	W	1.4	2.8	26	29
WNW	1.4	2.5	8	16	WNW	1.6	3.0	35	50	WNW	1.7	3.0	41	59
NW	1.5	2.6	17	21	NW	1.2	2.4	8	3	NW	1.3	2.5	11	6
NNW	2.0	3.0	11	12	NNW	1.1	2.5	1	1	NNW	1.2	2.4	1	0
N	1.8	3.0	8	18	N	1.0	2.4	1	2	N	0.9	2.1	0	1
LOCATION 5					LOCATION 5					LOCATION 5				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.5	2.5	4	2	NNE	1.6	2.9	5	2	NNE	1.0	1.9	3	2
NE	1.4	2.7	18	9	NE	1.0	2.1	3	1	NE	0.8	1.7	8	3
ENE	1.8	2.9	13	9	ENE	0.9	2.3	1	0	ENE	0.6	1.4	1	0
E	1.4	2.5	3	2	E	0.9	2.3	1	0	E	0.5	1.3	0	0
ESE	1.3	2.6	2	0	ESE	0.9	2.1	0	0	ESE	0.1	1.3	0	0
SE	1.0	2.1	0	0	SE	1.2	2.6	0	0	SE	0.8	2.2	1	0
SSE	1.4	2.5	0	0	SSE	1.4	2.7	0	0	SSE	1.1	2.3	0	1
S	1.6	2.6	2	1	S	1.8	2.9	2	1	S	1.0	2.2	5	3
SSW	1.6	2.5	2	1	SSW	1.5	2.6	2	0	SSW	1.0	2.1	5	2
SW	1.7	2.6	5	2	SW	1.3	2.3	1	0	SW	1.0	2.1	10	4
WSW	1.2	2.7	4	3	WSW	0.8	3.0	4	2	WSW	1.2	2.6	29	29
W	1.1	2.9	19	31	W	0.6	2.4	1	1	W	1.0	1.9	6	8
WNW	1.6	2.7	14	26	WNW	1.3	2.3	1	1	WNW	1.1	1.8	4	7
NW	1.5	2.6	12	12	NW	1.7	3.3	33	38	NW	1.0	2.0	15	16
NNW	0.9	2.1	0	0	NNW	2.3	3.9	33	30	NNW	1.2	2.1	4	4
N	1.1	2.3	0	2	N	2.2	3.7	14	23	N	1.1	2.4	8	18
LOCATION 6					LOCATION 6					LOCATION 6				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.5	2.7	5	2	NNE	1.0	2.5	1	0	NNE	1.1	2.4	2	1
NE	1.6	2.6	14	5	NE	0.8	1.9	1	0	NE	0.6	2.0	3	1
ENE	1.7	2.7	7	4	ENE	0.9	2.0	0	0	ENE	0.4	1.5	0	0
E	1.5	2.6	3	2	E	0.8	1.9	0	0	E	0.4	1.8	0	0
ESE	1.0	2.3	1	0	ESE	1.0	2.7	1	0	ESE	0.6	2.6	2	0
SE	1.0	2.0	0	0	SE	1.7	3.1	0	0	SE	1.4	2.9	1	0
SSE	1.4	2.5	0	0	SSE	1.4	2.7	0	0	SSE	1.4	2.5	0	0
S	1.7	2.7	2	1	S	1.6	2.5	1	0	S	1.4	2.3	1	0
SSW	1.7	2.6	2	1	SSW	1.1	2.2	0	0	SSW	1.2	2.2	0	0
SW	1.8	2.8	8	3	SW	0.8	2.0	0	0	SW	0.9	2.0	0	0
WSW	1.1	2.5	1	1	WSW	0.9	3.0	3	1	WSW	0.9	3.0	10	7
W	1.5	3.1	26	36	W	0.9	2.4	1	0	W	1.1	2.6	7	8
WNW	1.8	3.0	21	35	WNW	1.6	2.7	4	3	WNW	1.3	2.4	3	2
NW	1.4	2.5	6	3	NW	2.1	3.6	39	44	NW	1.5	3.0	28	30
NNW	1.1	2.3	0	0	NNW	2.7	4.2	38	33	NNW	2.2	3.5	24	21
N	1.6	2.9	3	7	N	2.1	3.7	11	17	N	1.9	3.6	19	29

TABLE C-22
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 7					LOCATION 7				LOCATION 7			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.6	2.8	5	3	NNE	0.9	2.5	2	1	NNE	0.9	2.2	1	1
NE	1.6	2.6	13	5	NE	0.7	1.5	0	0	NE	0.4	1.4	0	0
ENE	1.3	2.5	5	2	ENE	0.8	1.9	0	0	ENE	0.8	2.6	9	5
E	1.2	2.4	2	1	E	1.4	2.4	1	0	E	1.6	2.9	10	6
ESE	1.0	2.0	0	0	ESE	1.6	2.9	3	0	ESE	2.0	3.5	12	4
SE	1.3	2.4	0	0	SE	1.4	2.3	0	0	SE	1.5	2.6	0	0
SSE	1.6	2.6	0	0	SSE	1.6	2.5	0	0	SSE	1.5	2.7	0	0
S	1.7	2.6	2	1	S	1.5	2.4	1	0	S	1.4	2.4	1	1
SSW	1.7	2.6	2	1	SSW	1.4	2.3	1	0	SSW	1.3	2.2	1	0
SW	1.8	2.8	7	2	SW	1.4	2.4	2	0	SW	1.1	2.2	1	0
WSW	1.3	2.7	3	2	WSW	1.0	2.4	0	0	WSW	0.8	2.3	1	0
W	1.6	3.0	22	30	W	1.5	2.8	12	11	W	1.2	2.6	12	15
WNW	1.4	2.9	19	31	WNW	1.6	3.1	26	35	WNW	1.3	2.6	11	16
NW	1.7	2.9	17	17	NW	1.9	2.9	18	14	NW	1.4	2.5	9	7
NNW	1.4	2.6	1	1	NNW	2.1	3.5	18	14	NNW	1.1	3.0	9	8
N	1.5	2.7	2	4	N	2.0	3.6	15	23	N	1.6	3.5	21	35
LOCATION 8					LOCATION 8					LOCATION 8				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.7	2.8	5	2	NNE	1.0	2.2	1	0	NNE	0.7	1.7	0	0
NE	1.6	2.7	15	6	NE	0.9	1.9	1	0	NE	0.7	1.9	3	1
ENE	1.1	2.3	3	1	ENE	1.5	2.7	5	2	ENE	1.4	2.5	7	4
E	1.3	2.7	3	2	E	1.8	3.0	6	3	E	1.6	2.8	7	4
ESE	0.8	1.7	0	0	ESE	2.1	3.4	6	1	ESE	1.9	3.2	8	2
SE	0.9	1.9	0	0	SE	2.0	3.5	2	0	SE	1.7	3.1	2	0
SSE	1.4	2.5	0	0	SSE	1.5	2.7	0	0	SSE	1.4	2.7	0	0
S	1.7	2.8	2	1	S	1.3	2.4	0	0	S	1.1	2.1	0	0
SSW	1.8	2.8	4	1	SSW	1.0	2.0	0	0	SSW	1.1	2.2	1	0
SW	1.8	2.8	7	2	SW	1.0	2.0	0	0	SW	1.1	2.2	1	0
WSW	1.3	2.7	2	1	WSW	1.1	2.8	2	1	WSW	1.2	2.5	3	1
W	1.7	3.0	19	25	W	1.6	2.8	9	9	W	1.5	3.0	28	38
WNW	1.7	3.1	27	44	WNW	1.9	3.2	25	37	NNW	1.6	2.8	19	30
NW	1.6	2.7	9	6	NW	1.9	3.4	37	43	NW	1.3	2.6	13	11
NNW	1.5	2.5	0	0	NNW	1.2	3.0	4	2	NNW	1.5	3.0	9	8
N	1.9	3.1	4	9	N	0.9	1.9	0	0	N	0.7	1.8	0	0
LOCATION 9					LOCATION 9					LOCATION 9				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.7	3.0	12	6	NNE	0.9	2.1	1	0	NNE	0.7	2.0	0	0
NE	0.7	2.1	6	2	NE	0.8	2.0	4	1	NE	0.7	1.8	2	0
ENE	0.6	1.7	0	0	ENE	0.6	1.9	1	0	ENE	0.6	1.9	1	0
E	0.5	1.7	0	0	E	0.8	2.0	1	0	E	0.9	1.9	0	0
ESE	0.8	1.6	0	0	ESE	0.8	1.8	0	0	ESE	0.9	2.0	0	0
SE	0.9	2.0	0	0	SE	0.7	1.8	0	0	SE	0.8	1.8	0	0
SSE	1.4	2.6	0	0	SSE	1.2	2.3	0	0	SSE	1.1	2.4	0	0
S	1.5	2.7	3	2	S	1.2	2.5	1	1	S	1.1	2.3	1	0
SSW	1.8	2.8	7	2	SSW	1.4	2.4	2	0	SSW	1.3	2.4	2	0
SW	1.5	2.4	3	1	SW	1.3	2.3	2	0	SW	1.4	2.3	2	0
WSW	1.3	2.3	1	0	WSW	1.2	2.3	1	0	WSW	1.3	2.5	2	1
W	1.5	2.7	15	19	W	1.6	3.1	33	35	W	1.7	3.0	27	26
WNW	1.5	2.8	22	34	WNW	1.8	3.1	42	55	WNW	1.6	3.2	53	69
NW	1.6	2.6	12	9	NW	1.5	2.5	11	5	NW	1.2	2.5	8	3
NNW	1.9	3.1	12	10	NNW	1.0	2.5	1	0	NNW	1.0	2.4	1	0
N	1.9	3.0	7	14	N	1.2	2.5	1	3	N	1.0	2.2	0	0

TABLE C-23
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS

LOCATION 10

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.5	2.7	5	3
NE	1.7	2.8	20	10
ENE	1.5	2.7	8	5
E	1.6	2.8	5	3
ESE	0.8	2.2	0	0
SE	0.2	1.7	0	0
SSE	1.0	2.2	0	0
S	1.5	2.7	2	1
SSW	2.0	2.9	6	2
SW	2.0	2.9	12	6
WSW	1.4	2.7	3	2
W	1.6	3.0	23	40
WNW	1.4	2.7	9	18
NW	1.2	2.3	3	2
NNW	1.5	2.6	1	1
N	1.5	2.7	1	5

LOCATION 11

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.5	2.6	4	2
NE	1.8	2.9	25	13
ENE	1.5	2.6	7	4
E	1.6	2.7	4	3
ESE	0.7	2.0	0	0
SE	0.3	1.9	0	0
SSE	0.8	2.1	0	0
S	1.4	2.5	1	1
SSW	2.0	2.8	6	2
SW	2.0	3.0	15	8
WSW	1.4	2.7	3	3
W	1.6	3.0	21	37
WNW	1.3	2.6	8	16
NW	1.1	2.3	3	2
NNW	1.5	2.6	1	2
N	1.4	2.7	2	6

LOCATION 12

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.4	2.5	3	1
NE	1.6	2.8	19	9
ENE	1.7	2.6	7	4
E	1.5	2.7	4	3
ESE	1.3	2.4	1	0
SE	0.7	1.9	0	0
SSE	0.8	2.2	0	0
S	0.8	2.4	1	1
SSW	1.7	2.8	5	2
SW	2.0	2.9	11	5
WSW	1.5	2.8	5	4
W	1.7	3.1	30	50
WNW	1.5	2.6	6	11
NW	1.2	2.4	6	4
NNW	1.5	2.6	1	2
N	1.3	2.6	1	3

PROPOSED RUGGLES CENTER

LOCATION 10

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	0.8	1.7	1	1
NE	0.7	1.7	5	3
ENE	0.7	1.4	0	0
E	0.9	1.7	1	1
ESE	0.6	1.8	1	0
SE	0.6	2.3	1	0
SSE	0.1	1.7	0	0
S	0.1	1.6	0	0
SSW	1.0	2.3	8	5
SW	1.2	2.8	53	42
WSW	0.9	2.7	25	36
W	0.7	1.9	4	10
WNW	0.6	1.5	0	0
NW	0.8	1.7	2	2
NNW	0.8	1.5	0	0
N	0.8	1.7	0	1

LOCATION 11

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.1	2.3	1	1
NE	1.1	2.1	4	3
ENE	2.0	2.9	12	12
E	2.0	3.2	11	13
ESE	1.9	3.6	11	7
SE	1.6	3.2	1	1
SSE	0.9	2.8	0	1
S	1.1	2.5	1	1
SSW	1.8	3.2	12	9
SW	1.6	3.5	41	39
WSW	0.9	2.8	5	10
W	1.0	2.2	1	4
WNW	0.7	1.7	0	0
NW	0.7	1.6	0	0
NNW	0.8	1.6	0	0
N	1.0	2.0	0	0

LOCATION 12

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	0.8	2.1	2	1
NE	0.7	1.8	4	2
ENE	1.8	2.8	16	14
E	1.7	3.0	16	15
ESE	1.7	3.0	8	4
SE	1.6	2.9	2	1
SSE	1.1	2.7	0	1
S	1.3	2.7	5	5
SSW	1.7	2.7	10	5
SW	1.5	2.6	12	8
WSW	1.3	2.8	13	17
W	1.1	2.5	11	25
WNW	0.8	1.9	1	2
NW	0.6	1.4	0	0
NNW	0.7	1.5	0	0
N	0.7	1.8	0	0

PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES

LOCATION 10

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	0.6	1.4	0	0
NE	0.5	1.4	4	2
ENE	0.4	1.2	0	0
E	0.2	1.2	0	0
ESE	0.1	1.4	0	0
SE	0.5	1.9	0	0
SSE	0.6	1.8	0	0
S	0.7	1.8	1	2
SSW	1.0	2.3	17	11
SW	0.9	2.5	56	47
WSW	0.6	2.3	19	30
W	0.3	1.6	2	6
WNW	0.2	1.4	0	1
NW	0.1	1.2	0	0
NNW	0.1	1.3	0	0
N	0.1	1.3	0	0

LOCATION 11

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	0.9	1.9	0	0
NE	1.0	2.2	6	4
ENE	2.1	3.0	15	15
E	1.9	3.1	11	14
ESE	1.9	3.2	8	5
SE	1.6	3.1	2	1
SSE	0.6	2.4	0	0
S	1.0	2.4	1	1
SSW	1.5	3.1	14	11
SW	1.8	3.3	39	37
WSW	1.0	2.7	4	9
W	0.8	2.0	1	2
WNW	0.8	1.8	0	0
NW	0.7	1.5	0	0
NNW	0.6	1.5	0	0
N	0.8	1.9	0	0

LOCATION 12

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	0.5	1.6	0	0
NE	0.7	2.1	8	4
ENE	2.1	3.0	22	19
E	1.7	2.9	12	12
ESE	1.7	2.9	7	3
SE	1.6	2.8	1	1
SSE	1.1	2.5	0	1
S	1.4	2.8	5	5
SSW	1.5	2.6	6	3
SW	1.5	2.7	17	12
WSW	1.3	2.6	7	10
W	1.2	2.5	14	31
WNW	0.9	1.8	0	0
NW	0.6	1.4	0	0
NNW	0.4	1.4	0	0
N	0.6	1.6	0	0

TABLE C-24
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 13					LOCATION 13				LOCATION 13			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.4	2.4	2	1	NNE	0.8	2.4	3	2	NNE	0.7	1.8	0	0
NE	1.5	2.6	16	8	NE	0.6	1.9	3	1	NE	0.9	2.5	18	11
ENE	1.6	2.6	7	4	ENE	1.9	3.1	17	16	ENE	1.5	2.5	9	7
E	1.6	2.7	4	3	E	1.2	3.1	12	12	E	1.1	2.5	5	4
ESE	1.3	2.4	1	0	ESE	1.0	2.9	4	2	ESE	1.1	2.3	2	0
SE	1.3	2.4	0	0	SE	0.7	2.1	0	0	SE	1.0	2.4	0	0
SSE	1.0	2.2	0	0	SSE	0.8	2.7	0	1	SSE	1.1	2.7	0	1
S	0.5	1.9	0	0	S	2.0	3.4	11	12	S	1.7	3.2	10	11
SSW	1.4	2.8	6	2	SSW	2.4	3.4	22	15	SSW	1.9	3.0	17	10
SW	1.9	2.8	13	6	SW	1.8	2.9	17	13	SW	1.7	2.8	18	13
WSW	1.6	2.8	7	6	WSW	1.0	2.7	4	7	WSW	1.1	2.7	7	10
W	1.7	3.0	25	42	W	1.1	2.5	6	16	W	1.2	2.5	11	25
WNW	1.5	2.6	9	16	WNW	0.9	2.1	1	3	WNW	1.0	2.1	2	5
NW	1.3	2.4	6	4	NW	0.6	1.6	0	0	NW	0.6	1.6	0	0
NNW	1.4	2.8	3	3	NNW	0.8	1.4	0	0	NNW	0.5	1.3	0	0
N	1.2	2.5	1	3	N	0.4	1.6	0	0	N	0.4	1.6	0	0
LOCATION 14					LOCATION 14				LOCATION 14			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.4	2.5	3	1	NNE	2.0	3.5	23	18	NNE	2.0	3.3	22	18
NE	1.4	2.6	16	7	NE	0.9	2.4	9	4	NE	1.1	2.4	13	7
ENE	1.5	2.6	7	4	ENE	1.0	2.1	1	1	ENE	1.6	2.9	14	11
E	1.5	2.5	3	2	E	0.9	2.4	2	1	E	1.2	2.8	8	7
ESE	1.3	2.3	1	0	ESE	0.8	2.6	2	0	ESE	1.1	2.7	3	1
SE	1.5	2.6	0	0	SE	1.1	2.7	0	0	SE	1.2	2.3	0	0
SSE	0.8	1.9	0	0	SSE	1.8	3.3	1	2	SSE	1.5	2.9	0	1
S	0.6	1.8	0	0	S	2.3	3.6	13	11	S	1.9	3.1	7	7
SSW	1.3	2.6	4	1	SSW	2.3	3.3	15	8	SSW	1.8	2.9	8	5
SW	1.7	2.7	8	3	SW	1.5	2.6	5	3	SW	1.4	2.5	6	3
WSW	1.6	2.8	7	6	WSW	0.7	2.0	0	0	WSW	0.8	2.2	0	0
W	1.7	3.1	31	48	W	1.0	2.4	3	5	W	0.9	2.1	1	2
WNW	1.6	2.7	12	21	WNW	1.0	2.6	6	14	WNW	0.8	1.9	0	0
NW	1.3	2.4	6	4	NW	0.9	2.2	2	1	NW	0.7	1.7	0	0
NNW	1.1	2.4	1	0	NNW	2.1	3.3	13	17	NNW	1.9	3.0	10	15
N	1.3	2.3	0	2	N	1.9	3.0	5	15	N	1.8	3.0	7	21
LOCATION 15					LOCATION 15				LOCATION 15			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.6	2.8	6	3	NNE	1.6	3.2	10	5	NNE	1.3	2.8	3	1
NE	1.3	2.5	10	4	NE	1.1	2.5	7	2	NE	1.2	2.6	9	2
ENE	1.0	2.1	1	0	ENE	1.2	2.5	3	1	ENE	1.2	2.5	3	1
E	1.0	2.5	2	1	E	1.5	2.9	4	2	E	1.4	2.8	3	1
ESE	0.6	1.6	0	0	ESE	1.4	2.5	1	0	ESE	1.3	2.5	1	0
SE	0.5	1.4	0	0	SE	1.4	2.6	0	0	SE	1.3	2.3	0	0
SSE	0.9	1.7	0	0	SSE	0.9	2.1	0	0	SSE	1.0	2.1	0	0
S	0.8	1.8	0	0	S	1.3	2.6	1	0	S	1.3	2.6	1	0
SSW	1.1	2.6	3	1	SSW	1.5	2.7	2	0	SSW	1.5	2.8	2	0
SW	1.6	3.1	17	8	SW	2.0	3.2	13	5	SW	1.9	3.0	8	2
WSW	1.9	3.3	18	17	WSW	1.7	3.0	4	2	WSW	1.7	3.1	6	3
W	1.8	3.1	24	36	W	1.7	3.0	13	16	W	1.7	3.2	17	19
WNW	1.2	2.8	12	22	WNW	1.7	3.4	34	58	WNW	1.7	3.6	42	66
NW	0.8	2.5	5	3	NW	1.5	2.6	6	3	NW	1.4	2.6	4	1
NNW	1.1	2.6	1	1	NNW	0.8	1.8	0	0	NNW	0.6	1.6	0	0
N	1.5	2.7	1	4	N	1.4	2.9	2	5	N	1.2	2.8	1	2

TABLE C-25
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS

LOCATION 16

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.0	2.1	0	0
NE	1.2	2.3	6	2
ENE	1.2	2.3	3	1
E	1.4	2.6	3	1
ESE	1.3	2.4	1	0
SE	1.1	2.4	0	0
SSE	1.2	2.5	0	0
S	0.9	2.3	0	0
SSW	0.7	2.2	0	0
SW	1.5	2.9	10	3
WSW	1.7	3.1	9	6
W	2.1	3.4	40	54
WNW	2.0	3.0	20	29
NW	1.5	2.5	6	3
NNW	1.5	2.7	1	1
N	1.1	2.2	0	0

LOCATION 17

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.2	2.7	4	2
NE	1.6	2.9	22	10
ENE	1.3	2.6	5	2
E	1.5	2.8	4	3
ESE	1.5	2.5	1	0
SE	1.9	3.0	1	0
SSE	1.4	2.8	0	0
S	1.6	2.8	2	2
SSW	0.9	2.1	0	0
SW	1.3	2.7	5	2
WSW	1.5	2.8	4	3
W	1.6	3.2	26	40
WNW	1.6	2.8	11	20
NW	1.6	2.8	11	11
NNW	1.6	2.8	2	2
N	1.4	2.5	1	2

LOCATION 18

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.4	2.4	4	2
NE	1.2	2.3	10	4
ENE	1.4	2.6	9	5
E	1.3	2.5	4	2
ESE	1.0	2.1	1	0
SE	1.3	2.4	0	0
SSE	0.8	2.1	0	0
S	0.7	2.2	1	0
SSW	0.8	2.2	1	0
SW	1.3	2.5	6	2
WSW	1.5	2.6	5	3
W	1.8	3.1	39	58
WNW	1.6	2.5	9	13
NW	1.4	2.4	9	6
NNW	1.2	2.4	1	1
N	1.4	2.4	1	2

PROPOSED RUGGLES CENTER

LOCATION 16

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.5	2.9	4	1
NE	1.1	2.3	4	1
ENE	1.4	2.5	2	1
E	1.2	2.3	1	0
ESE	0.9	1.9	0	0
SE	1.0	2.0	0	0
SSE	0.8	2.2	0	0
S	1.2	2.7	1	0
SSW	1.5	2.8	2	0
SW	1.8	3.0	7	2
WSW	1.9	3.4	10	6
W	1.8	3.6	36	44
WNW	1.8	3.4	31	43
NW	1.0	2.4	1	0
NNW	1.2	2.4	0	0
N	1.2	2.8	1	2

LOCATION 17

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.1	2.5	3	1
NE	1.5	2.8	21	9
ENE	1.4	2.6	6	3
E	1.5	2.6	4	2
ESE	1.2	2.4	1	0
SE	1.7	2.9	1	0
SSE	1.1	2.4	0	0
S	1.1	2.4	1	0
SSW	1.2	2.5	2	0
SW	1.4	2.7	7	2
WSW	1.5	2.9	7	5
W	1.7	2.9	17	22
WNW	1.6	3.1	29	50
NW	0.5	2.0	1	0
NNW	1.4	2.4	0	0
N	1.4	2.8	2	5

LOCATION 18

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.6	3.3	16	10
NE	1.4	2.8	17	8
ENE	1.5	2.7	7	4
E	1.4	2.5	2	1
ESE	1.1	2.2	0	0
SE	1.0	2.1	0	0
SSE	0.6	2.0	0	0
S	1.2	2.5	1	1
SSW	1.3	2.7	3	1
SW	1.5	2.8	6	3
WSW	1.1	2.4	1	0
W	1.3	3.1	26	42
WNW	1.0	2.8	9	17
NW	0.9	2.4	4	3
NNW	1.9	3.1	6	7
N	1.0	2.6	1	4

PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES

LOCATION 16

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.1	2.6	2	0
NE	1.2	2.3	4	1
ENE	1.4	2.4	2	1
E	1.1	2.5	1	0
ESE	0.9	2.0	0	0
SE	1.0	2.2	0	0
SSE	0.7	2.2	0	0
S	1.1	2.5	1	0
SSW	1.4	2.6	1	0
SW	1.6	2.9	5	1
WSW	1.9	3.3	10	6
W	1.8	3.6	37	42
WNW	1.7	3.5	35	47
NW	0.8	2.3	1	0
NNW	0.9	2.2	0	0
N	1.2	2.8	1	2

LOCATION 17

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.1	2.6	5	2
NE	1.2	2.5	15	6
ENE	1.4	2.5	7	4
E	1.4	2.5	3	2
ESE	1.2	2.3	1	0
SE	1.5	2.8	1	0
SSE	1.0	2.5	0	0
S	1.0	2.3	1	0
SSW	1.3	2.7	4	1
SW	1.3	2.7	10	4
WSW	1.4	2.7	6	4
W	1.7	2.9	21	31
WNW	1.5	2.9	22	39
NW	0.5	1.7	0	0
NNW	1.3	2.5	1	1
N	1.2	2.7	3	6

LOCATION 18

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.3	2.9	8	4
NE	1.4	2.8	19	9
ENE	1.5	2.8	9	5
E	1.4	2.6	3	2
ESE	1.1	2.1	0	0
SE	1.2	2.1	0	0
SSE	0.9	1.9	0	0
S	1.2	2.5	1	1
SSW	1.3	2.6	3	1
SW	1.5	2.8	8	3
WSW	1.2	2.6	2	1
W	1.4	3.3	40	62
WNW	1.1	2.5	4	6
NW	0.6	1.7	0	0
NNW	1.4	2.6	1	1
N	1.1	2.7	1	4

TABLE C-26
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 19					LOCATION 19				LOCATION 19			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.4	2.5	3	2	NNE	2.3	3.8	25	17	NNE	2.0	3.3	28	23
NE	1.5	2.6	16	7	NE	1.2	2.6	9	3	NE	0.7	1.9	4	2
ENE	1.7	2.6	8	5	ENE	1.6	2.9	8	5	ENE	1.7	2.7	13	10
E	1.5	2.5	4	2	E	1.2	2.7	2	1	E	1.5	2.6	7	6
ESE	1.4	2.5	2	0	ESE	1.6	2.7	2	0	ESE	1.8	2.9	6	3
SE	1.6	2.7	0	0	SE	1.9	2.9	0	0	SE	1.9	3.0	2	1
SSE	0.9	2.0	0	0	SSE	2.1	3.9	2	3	SSE	2.0	3.5	3	5
S	0.4	1.8	0	0	S	2.0	4.2	17	13	S	1.9	3.8	22	21
SSW	1.4	2.7	5	2	SSW	0.7	1.7	0	0	SSW	0.4	2.1	1	0
SW	1.9	2.8	11	5	SW	0.7	1.8	0	0	SW	0.4	1.3	0	0
WSW	1.7	2.9	8	8	WSW	0.8	1.9	0	0	WSW	0.7	1.7	0	0
W	1.7	2.9	20	34	W	1.0	2.4	1	2	W	0.6	1.6	0	0
WNW	1.5	2.7	11	22	WNW	1.4	3.1	17	33	WNW	0.5	1.5	0	0
NW	1.3	2.5	9	9	NW	1.1	2.4	2	1	NW	0.7	1.8	0	0
NNW	1.2	2.6	1	2	NNW	2.0	3.4	8	9	NNW	1.7	2.7	6	9
N	1.3	2.3	0	2	N	2.0	3.3	6	14	N	1.7	2.9	7	21
LOCATION 20					LOCATION 20				LOCATION 20			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.4	2.6	4	2	NNE	2.4	3.7	13	7	NNE	2.1	3.4	33	29
NE	1.6	2.6	16	7	NE	1.2	2.4	4	1	NE	0.7	2.1	10	5
ENE	1.7	2.9	11	7	ENE	2.2	3.3	9	4	ENE	1.3	2.5	10	9
E	1.3	2.4	2	1	E	2.0	3.4	7	4	E	1.6	2.7	10	9
ESE	1.4	2.5	2	0	ESE	2.2	3.3	3	1	ESE	2.0	3.0	9	4
SE	1.5	2.6	0	0	SE	1.9	2.8	0	0	SE	1.9	3.0	2	1
SSE	0.8	2.1	0	0	SSE	1.6	3.0	0	0	SSE	1.5	2.7	0	1
S	0.7	2.1	0	0	S	1.5	3.2	2	1	S	1.4	2.8	6	6
SSW	1.6	2.7	3	1	SSW	1.1	2.2	0	0	SSW	0.6	1.7	0	0
SW	1.9	2.9	11	5	SW	0.9	2.2	0	0	SW	0.7	1.8	0	0
WSW	1.7	2.8	5	4	WSW	0.8	2.3	0	0	WSW	0.4	1.4	0	0
W	1.8	3.2	32	52	W	1.2	3.0	7	7	W	0.5	1.6	0	0
WNW	1.6	2.6	7	13	WNW	1.8	3.7	37	61	WNW	0.4	1.3	0	0
NW	1.3	2.3	4	2	NW	1.6	2.9	6	3	NW	1.1	2.1	5	6
NNW	1.3	2.7	2	2	NNW	2.5	3.8	11	9	NNW	1.8	2.8	10	17
N	1.3	2.6	1	3	N	1.9	3.0	1	2	N	1.5	2.5	3	11
LOCATION 21					LOCATION 21				LOCATION 21			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.2	2.5	3	2	NNE	0.8	2.5	1	1	NNE	1.0	2.1	11	9
NE	1.7	2.7	17	8	NE	0.9	2.2	3	1	NE	0.4	1.7	11	6
ENE	1.8	2.9	11	7	ENE	2.3	3.7	23	17	ENE	0.7	1.8	7	5
E	1.4	2.5	3	2	E	2.3	3.9	21	18	E	1.3	2.5	22	21
ESE	1.5	2.6	2	0	ESE	2.6	3.9	10	4	ESE	1.5	2.5	13	7
SE	1.6	2.6	0	0	SE	2.0	3.0	0	0	SE	1.4	2.3	2	1
SSE	0.9	2.2	0	0	SSE	1.5	2.7	0	0	SSE	0.9	1.8	0	0
S	1.0	2.5	1	1	S	1.2	2.8	1	1	S	1.1	2.3	9	9
SSW	1.7	2.6	3	1	SSW	1.4	2.8	2	1	SSW	0.6	1.6	1	0
SW	1.9	2.8	9	4	SW	0.8	2.0	0	0	SW	0.1	1.3	0	0
WSW	1.8	2.9	7	6	WSW	0.7	1.7	0	0	WSW	0.4	1.3	0	0
W	1.7	3.1	28	46	W	0.9	2.2	0	0	W	0.6	1.5	1	2
WNW	1.5	2.7	9	17	WNW	1.1	3.1	14	31	WNW	0.4	1.3	0	0
NW	1.2	2.3	4	2	NW	1.5	2.9	11	12	NW	0.6	1.6	5	6
NNW	1.2	2.6	1	1	NNW	2.0	3.5	11	13	NNW	0.9	2.1	8	12
N	1.0	2.4	0	2	N	1.2	2.5	0	1	N	0.7	2.1	7	21

TABLE C-27
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 22					LOCATION 22				LOCATION 22			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.4	2.4	2	1	NNE	1.8	2.9	6	3	NNE	0.3	1.3	0	0
NE	1.6	2.7	17	8	NE	1.0	2.3	6	2	NE	0.4	1.4	6	2
ENE	1.7	2.8	10	6	ENE	0.9	2.4	3	1	ENE	0.5	1.4	2	1
E	1.3	2.5	3	2	E	1.0	2.4	1	1	E	0.5	1.4	1	0
ESE	1.5	2.5	1	0	ESE	1.6	3.2	5	1	ESE	0.6	1.5	1	0
SE	1.3	2.4	0	0	SE	2.1	3.5	2	1	SE	0.3	1.2	0	0
SSE	0.9	2.3	0	0	SSE	2.1	3.5	1	1	SSE	0.6	1.3	0	0
S	0.9	2.3	1	0	S	2.0	3.4	7	5	S	0.1	1.2	0	0
SSW	1.8	2.7	5	2	SSW	1.4	3.1	7	2	SSW	0.5	1.5	1	0
SW	2.0	2.9	12	6	SW	0.9	2.1	0	0	SW	0.6	1.3	0	0
WSW	1.8	2.9	8	7	WSW	1.4	2.6	1	1	WSW	0.7	1.6	2	1
W	1.8	3.1	27	43	W	1.5	2.6	4	4	W	0.8	1.5	3	3
WNW	1.5	2.7	12	22	WNW	1.9	3.3	35	58	WNW	0.8	1.5	3	3
NW	0.9	2.1	2	1	NW	1.5	2.8	12	9	NW	0.9	2.0	35	39
NNW	0.8	2.2	0	0	NNW	1.7	3.0	4	3	NNW	0.8	2.0	13	10
N	1.1	2.4	0	2	N	1.9	3.1	4	9	N	0.8	2.4	29	40
LOCATION 23					LOCATION 23					LOCATION 23				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.5	2.4	3	1	NNE	0.9	2.1	0	0	NNE	0.8	1.6	0	0
NE	1.6	2.7	19	9	NE	1.1	2.5	5	1	NE	0.7	1.9	7	1
ENE	1.7	2.9	12	8	ENE	0.9	2.2	1	0	ENE	0.6	1.6	1	0
E	1.2	2.3	2	1	E	1.7	3.1	4	2	E	0.8	1.6	0	0
ESE	1.6	2.6	2	0	ESE	2.3	3.9	9	3	ESE	0.7	1.6	0	0
SE	1.4	2.6	0	0	SE	2.4	3.9	3	1	SE	0.3	1.3	0	0
SSE	1.0	2.4	0	0	SSE	2.4	3.7	1	1	SSE	0.6	1.4	0	0
S	0.8	2.0	0	0	S	2.3	3.6	6	4	S	0.1	1.6	0	0
SSW	1.7	2.8	6	3	SSW	1.3	3.2	5	1	SSW	0.6	1.4	0	0
SW	1.9	2.9	15	8	SW	0.9	2.3	0	0	SW	0.7	1.6	0	0
WSW	1.8	3.0	10	10	WSW	1.7	3.0	3	1	WSW	1.3	2.7	21	12
W	1.8	2.9	19	34	W	1.9	3.2	14	18	W	1.5	2.9	62	77
WNW	1.5	2.6	10	21	WNW	2.1	3.4	26	42	WNW	1.0	2.2	9	9
NW	0.9	2.0	1	0	NW	1.7	2.9	8	5	NW	0.4	1.4	0	0
NNW	1.0	2.3	0	0	NNW	2.2	3.5	9	8	NNW	0.5	1.6	0	0
N	1.2	2.3	0	2	N	2.1	3.5	6	12	N	0.7	1.7	0	0
LOCATION 24					LOCATION 24					LOCATION 24				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.3	2.3	2	1	NNE	1.0	2.3	0	0	NNE	0.2	1.2	0	0
NE	1.5	2.5	12	5	NE	1.2	2.7	6	2	NE	0.4	1.6	6	2
ENE	1.6	2.7	8	5	ENE	0.8	2.1	0	0	ENE	0.5	1.5	1	1
E	1.3	2.4	2	1	E	1.9	3.2	4	2	E	1.0	2.3	13	11
ESE	1.4	2.5	2	0	ESE	2.3	3.6	5	1	ESE	1.4	2.7	15	8
SE	1.4	2.6	0	0	SE	2.4	3.6	1	0	SE	1.6	2.8	6	3
SSE	1.0	2.3	0	0	SSE	2.2	3.5	0	0	SSE	1.3	2.5	1	2
S	0.8	2.0	0	0	S	2.2	3.5	4	2	S	1.3	2.3	6	5
SSW	1.6	2.9	7	3	SSW	1.9	3.1	3	0	SSW	1.6	2.4	18	9
SW	1.9	2.8	11	5	SW	0.8	2.1	0	0	SW	0.6	1.8	4	2
WSW	1.8	3.0	10	9	WSW	1.6	3.1	2	1	WSW	0.5	2.1	6	7
W	1.8	3.1	27	44	W	2.1	3.4	15	15	W	0.8	2.0	15	28
WNW	1.6	2.7	12	22	WNW	2.3	3.9	45	66	WNW	0.6	1.9	8	20
NW	1.1	2.4	5	4	NW	1.7	2.9	5	2	NW	0.1	1.2	0	0
NNW	1.1	2.4	0	0	NNW	2.3	3.7	7	4	NNW	0.1	1.3	0	0
N	1.2	2.3	0	2	N	1.8	3.4	3	5	N	0.6	1.6	0	1

TABLE C-28
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS

LOCATION 25

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.4	2.3	2	1
NE	1.4	2.4	13	5
ENE	1.5	2.6	8	5
E	1.5	2.6	4	2
ESE	1.5	2.5	2	0
SE	1.6	2.8	1	0
SSE	1.0	2.6	0	0
S	0.8	2.1	0	0
SSW	1.2	2.8	7	2
SW	1.7	2.7	9	4
WSW	1.7	2.8	8	7
W	1.7	3.0	31	50
WNW	1.6	2.6	9	15
NW	1.1	2.3	5	3
NNW	1.2	2.4	1	1
N	1.3	2.4	1	3

LOCATION 26

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.5	2.5	3	2
NE	1.6	2.7	19	10
ENE	1.5	2.7	9	7
E	1.3	2.7	5	4
ESE	1.5	2.5	2	0
SE	1.2	2.3	0	0
SSE	1.1	2.4	0	0
S	1.0	2.3	1	1
SSW	1.8	2.9	7	3
SW	2.0	2.8	11	6
WSW	2.0	3.2	18	21
W	1.5	2.9	18	34
WNW	0.9	2.3	2	5
NW	1.0	2.3	4	3
NNW	1.1	2.3	0	0
N	1.3	2.5	1	4

LOCATION 27

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.5	2.7	6	3
NE	1.5	2.6	15	7
ENE	1.6	2.7	8	5
E	1.2	2.3	1	1
ESE	1.6	2.6	2	0
SE	1.2	2.3	0	0
SSE	1.2	2.6	0	0
S	0.9	2.1	0	0
SSW	1.7	2.7	5	2
SW	2.0	2.9	15	8
WSW	1.9	3.1	12	13
W	1.7	3.0	22	38
WNW	1.2	2.5	6	12
NW	1.1	2.5	7	6
NNW	1.2	2.3	0	0
N	1.3	2.5	1	4

PROPOSED RUGGLES CENTER

LOCATION 25

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.0	2.5	1	0
NE	1.2	2.8	10	3
ENE	1.8	2.8	4	2
E	1.5	3.0	3	1
ESE	1.7	2.9	1	0
SE	1.8	2.9	0	0
SSE	1.7	3.2	0	0
S	1.6	3.1	2	1
SSW	1.8	3.0	3	1
SW	1.5	2.8	2	0
WSW	1.5	3.1	3	2
W	1.7	3.2	14	15
WNW	2.2	3.7	42	65
NW	1.6	2.8	5	2
NNW	2.2	3.6	8	6
N	1.5	2.8	1	2

LOCATION 26

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.7	2.8	6	4
NE	0.6	1.8	1	0
ENE	1.2	2.6	5	4
E	1.7	3.0	7	6
ESE	1.4	3.0	4	1
SE	1.2	2.6	0	0
SSE	1.7	3.0	0	1
S	2.1	3.3	7	6
SSW	2.6	3.7	28	16
SW	1.3	3.0	14	9
WSW	0.8	2.4	1	1
W	0.8	2.5	4	8
WNW	0.8	2.3	1	2
NW	1.0	2.5	6	6
NNW	1.1	2.9	3	4
N	2.3	3.5	13	30

LOCATION 27

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	0.9	1.6	0	0
NE	0.7	1.6	0	0
ENE	0.7	1.9	0	0
E	1.3	2.5	1	1
ESE	1.2	2.8	2	0
SE	1.2	2.5	0	0
SSE	1.6	2.8	0	0
S	2.0	3.4	6	6
SSW	2.8	4.1	35	22
SW	1.6	3.5	29	21
WSW	1.3	2.6	1	1
W	1.3	2.5	3	6
WNW	1.3	2.2	0	1
NW	1.8	3.0	15	26
NNW	1.6	3.1	5	8
N	1.1	2.8	1	6

PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES

LOCATION 25

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	0.5	2.1	1	0
NE	0.7	2.1	5	1
ENE	0.4	1.9	1	0
E	0.9	2.1	1	0
ESE	1.2	2.6	3	0
SE	1.4	2.6	0	0
SSE	1.4	2.7	0	0
S	0.7	1.8	0	0
SSW	0.6	2.2	1	0
SW	0.5	1.6	0	0
WSW	1.4	2.9	10	5
W	1.6	3.2	41	47
WNW	1.3	3.0	35	46
NW	0.7	2.0	1	0
NNW	0.8	2.0	0	0
N	0.8	2.2	0	1

LOCATION 26

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.5	2.4	10	6
NE	0.5	1.7	5	1
ENE	1.2	2.2	10	6
E	1.4	2.4	9	6
ESE	0.9	2.2	3	0
SE	0.4	1.4	0	0
SSE	0.6	1.7	0	0
S	0.8	1.8	0	0
SSW	1.0	1.8	1	0
SW	0.5	1.5	0	0
WSW	0.6	1.9	1	0
W	0.6	2.0	4	4
WNW	0.7	2.1	9	14
NW	1.1	2.3	19	19
NNW	0.9	2.4	7	6
N	1.9	2.9	21	35

LOCATION 27

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	0.1	1.2	0	0
NE	0.5	1.5	3	0
ENE	0.1	1.4	0	0
E	0.6	1.6	1	0
ESE	0.6	1.5	0	0
SE	0.4	1.5	0	0
SSE	0.6	1.6	0	0
S	0.7	1.6	0	0
SSW	0.6	1.5	0	0
SW	0.7	1.6	1	0
WSW	1.1	2.2	10	5
W	1.2	2.6	54	66
WNW	1.0	2.1	17	19
NW	1.1	2.0	12	7
NNW	1.0	1.9	1	0
N	0.8	1.9	1	2

TABLE C-29
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 28					LOCATION 28				LOCATION 28			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.5	2.5	3	2	NNE	1.0	1.9	0	0	NNE	0.3	1.3	0	0
NE	1.5	2.6	16	8	NE	0.7	1.5	0	0	NE	0.5	1.4	1	0
ENE	1.6	2.8	10	6	ENE	0.7	1.9	0	0	ENE	0.1	1.2	0	0
E	1.2	2.4	2	1	E	1.1	2.3	1	0	E	0.7	1.7	1	0
ESE	1.6	2.6	2	0	ESE	1.0	2.9	3	1	ESE	0.7	1.9	1	0
SE	1.3	2.4	0	0	SE	1.4	2.9	0	0	SE	0.6	1.8	0	0
SSE	1.3	2.6	0	0	SSE	2.0	3.4	1	1	SSE	1.2	2.4	0	1
S	1.0	2.2	1	0	S	1.8	2.8	2	1	S	1.1	2.1	2	1
SSW	1.6	2.8	6	2	SSW	2.4	3.6	19	9	SSW	1.6	2.8	24	10
SW	1.9	2.8	11	5	SW	1.7	3.4	27	15	SW	0.8	1.8	1	0
WSW	1.8	2.9	8	8	WSW	1.9	3.2	9	8	WSW	0.8	2.4	13	9
W	1.8	2.9	22	37	W	2.0	3.2	22	37	W	1.2	2.6	44	61
WNW	1.4	2.6	9	18	WNW	1.9	2.9	11	21	WNW	0.9	2.1	11	16
NW	1.2	2.5	7	6	NW	1.7	2.5	5	3	NW	0.7	1.5	1	0
NNW	1.3	2.5	1	1	NNW	1.5	2.7	1	1	NNW	0.6	1.6	0	0
N	1.5	2.5	1	4	N	1.1	2.6	0	2	N	0.3	1.9	0	2
LOCATION 29					LOCATION 29					LOCATION 29				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.5	2.5	3	2	NNE	0.8	1.8	0	0	NNE	0.4	1.5	0	0
NE	1.4	2.5	12	5	NE	0.9	1.8	1	0	NE	0.5	1.6	3	2
ENE	1.6	2.8	9	6	ENE	0.1	1.2	0	0	ENE	0.7	1.5	1	0
E	1.4	2.6	4	2	E	1.1	2.6	2	1	E	1.3	2.9	27	28
ESE	1.6	2.6	2	0	ESE	1.5	3.2	4	1	ESE	2.0	3.4	27	19
SE	1.3	2.4	0	0	SE	2.6	4.2	6	2	SE	2.3	3.6	16	11
SSE	1.4	2.7	0	0	SSE	2.4	4.0	2	3	SSE	2.1	3.6	10	14
S	1.0	2.3	1	0	S	1.1	2.5	0	0	S	1.1	2.6	9	10
SSW	1.4	2.8	5	2	SSW	1.0	2.7	2	0	SSW	0.7	1.8	1	1
SW	1.8	2.8	10	4	SW	1.3	2.9	6	2	SW	0.6	1.7	0	0
WSW	1.7	2.9	8	7	WSW	2.2	3.6	21	16	WSW	0.7	1.5	0	0
W	1.8	2.9	21	33	W	2.3	3.4	27	36	W	0.8	1.9	4	10
WNW	1.5	2.8	14	25	WNW	2.2	3.3	23	36	WNW	0.7	1.7	1	2
NW	1.3	2.5	8	7	NW	1.8	2.7	7	4	NW	0.3	1.3	0	0
NNW	1.2	2.4	0	0	NNW	1.4	2.4	0	0	NNW	0.4	1.3	0	0
N	1.5	2.7	2	5	N	0.9	2.2	0	0	N	0.1	1.3	0	0
LOCATION 30					LOCATION 30					LOCATION 30				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.4	2.5	3	1	NNE	0.9	2.1	0	0	NNE	0.7	1.6	0	0
NE	1.3	2.4	12	5	NE	1.0	2.2	3	1	NE	0.6	1.8	5	2
ENE	1.5	2.8	11	7	ENE	1.9	3.0	9	4	ENE	1.8	2.8	25	21
E	1.5	2.5	3	2	E	1.7	3.2	7	4	E	1.5	2.9	19	18
ESE	1.5	2.6	2	0	ESE	2.3	3.5	7	2	ESE	2.1	3.3	18	11
SE	1.3	2.4	0	0	SE	2.4	3.6	2	0	SE	2.0	3.2	5	3
SSE	1.4	2.7	0	0	SSE	2.0	3.6	1	1	SSE	1.5	3.0	2	4
S	1.0	2.3	1	1	S	0.9	2.5	1	0	S	0.9	2.2	2	2
SSW	1.2	2.6	3	1	SSW	1.2	2.4	1	0	SSW	1.0	2.2	3	2
SW	1.7	2.7	8	3	SW	1.1	2.3	0	0	SW	0.8	1.9	1	1
WSW	1.7	2.9	8	7	WSW	2.1	3.4	12	9	WSW	0.9	2.2	3	4
W	1.7	2.9	24	38	W	2.2	3.4	30	41	W	0.8	2.3	13	28
WNW	1.5	2.6	8	14	WNW	2.1	3.2	23	36	WNW	0.3	1.8	1	3
NW	1.2	2.7	14	15	NW	1.6	2.6	5	2	NW	0.1	1.5	0	0
NNW	1.2	2.5	1	1	NNW	1.2	2.4	0	0	NNW	0.5	1.3	0	0
N	1.5	2.5	1	4	N	1.0	2.3	0	0	N	0.1	1.4	0	0

TABLE C-30
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS

LOCATION 31

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.4	2.6	4	2
NE	1.3	2.4	10	4
ENE	1.6	2.7	8	5
E	1.5	2.7	5	3
ESE	1.7	2.8	4	1
SE	1.4	2.7	0	0
SSE	1.5	2.9	0	1
S	1.2	2.6	2	1
SSW	1.0	2.7	4	1
SW	1.6	2.7	8	3
WSW	1.7	2.8	7	6
W	1.7	2.8	17	26
WNW	1.3	2.6	8	14
NW	1.6	2.9	21	27
NNW	1.4	2.5	1	1
N	1.6	2.5	1	3

LOCATION 32

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.4	2.7	4	2
NE	1.2	2.2	6	2
ENE	1.7	2.8	9	6
E	1.3	2.5	3	2
ESE	1.8	3.0	5	1
SE	1.7	2.9	1	0
SSE	1.5	2.7	0	0
S	1.3	2.5	1	1
SSW	1.1	2.5	2	0
SW	1.6	2.9	12	5
WSW	1.7	2.7	4	3
W	1.6	2.9	18	27
WNW	1.1	2.4	4	5
NW	1.9	3.1	29	40
NNW	1.3	2.5	1	1
N	1.6	2.7	2	5

LOCATION 33

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.4	2.7	6	3
NE	1.1	2.3	9	3
ENE	1.7	2.8	10	7
E	1.2	2.5	3	2
ESE	1.8	2.9	4	1
SE	1.7	2.8	1	0
SSE	1.4	2.6	0	0
S	1.4	2.6	2	2
SSW	1.2	2.6	4	1
SW	1.6	2.7	10	4
WSW	1.7	2.7	5	5
W	1.4	2.8	15	24
WNW	1.4	2.7	12	24
NW	1.7	2.7	16	19
NNW	1.4	2.5	1	1
N	1.3	2.5	1	4

PROPOSED RUGGLES CENTER

LOCATION 31

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	0.7	1.7	0	0
NE	0.6	1.8	3	2
ENE	1.9	3.0	20	22
E	1.3	2.9	12	15
ESE	1.4	3.1	9	6
SE	0.9	2.8	1	1
SSE	0.5	2.1	0	0
S	0.8	2.8	4	6
SSW	2.1	3.5	34	28
SW	1.4	2.8	17	18
WSW	0.7	1.7	0	0
W	0.7	1.4	0	0
WNW	0.7	1.8	0	1
NW	0.7	1.6	0	0
NNW	0.7	1.4	0	0
N	0.7	1.9	0	1

LOCATION 32

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	0.9	2.3	4	5
NE	1.0	2.6	24	19
ENE	1.5	2.6	12	13
E	0.7	2.2	3	3
ESE	1.0	2.5	4	2
SE	0.9	2.5	1	0
SSE	1.2	2.6	0	1
S	1.1	2.5	4	5
SSW	1.9	3.1	23	18
SW	1.5	2.7	22	22
WSW	0.8	1.7	0	0
W	0.9	1.9	1	3
WNW	0.9	2.0	1	5
NW	0.6	1.8	1	1
NNW	0.6	1.2	0	0
N	0.4	1.7	0	1

LOCATION 33

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	1.0	2.2	1	1
NE	1.5	3.4	45	37
ENE	1.9	3.4	26	28
E	0.5	1.9	0	0
ESE	0.7	2.3	1	0
SE	0.7	2.3	0	0
SSE	1.3	3.1	0	2
S	1.2	3.0	4	6
SSW	1.8	3.3	16	15
SW	1.5	2.7	7	8
WSW	0.7	1.8	0	0
W	0.8	1.6	0	0
WNW	0.8	1.8	0	0
NW	0.7	1.4	0	0
NNW	0.6	1.3	0	0
N	0.7	1.5	0	0

PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES

LOCATION 31

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	0.5	1.6	0	0
NE	0.6	2.0	7	5
ENE	1.9	3.1	28	29
E	1.3	3.0	18	21
ESE	1.5	3.2	13	9
SE	0.8	2.7	1	1
SSE	0.1	2.6	0	2
S	0.6	2.2	1	2
SSW	1.7	2.9	18	15
SW	1.4	2.5	11	11
WSW	0.5	2.0	0	1
W	0.4	1.4	0	0
WNW	0.6	1.7	0	1
NW	0.6	1.4	0	0
NNW	0.6	1.5	0	0
N	0.7	1.9	0	2

LOCATION 32

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	0.7	2.3	7	8
NE	0.9	2.3	23	19
ENE	1.2	2.4	13	15
E	0.7	2.1	3	4
ESE	1.1	2.7	8	5
SE	0.9	2.2	0	0
SSE	1.3	2.7	1	3
S	1.1	2.5	5	7
SSW	1.6	2.9	24	20
SW	1.2	2.4	15	17
WSW	0.5	1.6	0	0
W	0.6	1.5	0	0
WNW	0.6	1.5	0	0
NW	0.5	1.3	0	0
NNW	0.3	1.3	0	0
N	0.5	1.6	0	0

LOCATION 33

WIND ANGLE	RATIOS MEAN	RATIOS GUST	WEIGHT FALL	WEIGHT WIN
NNE	0.9	2.1	1	1
NE	1.4	3.3	45	38
ENE	1.9	3.4	28	30
E	0.7	2.1	1	1
ESE	0.9	2.3	1	0
SE	0.8	2.4	0	0
SSE	1.4	3.2	1	3
S	1.0	3.0	6	8
SSW	1.7	3.0	13	11
SW	1.2	2.5	4	5
WSW	0.6	1.8	0	0
W	0.6	1.7	0	0
WNW	0.7	1.8	0	0
NW	0.5	1.4	0	0
NNW	0.5	1.3	0	0
N	0.5	1.9	0	1

TABLE C-31
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 34					LOCATION 34				LOCATION 34			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.1	2.4	3	1	NNE	2.3	3.6	14	12	NNE	2.0	3.4	14	14
NE	0.9	2.1	5	2	NE	2.2	3.6	34	22	NE	2.0	3.4	34	24
ENE	1.6	2.8	11	6	ENE	2.0	3.6	17	15	ENE	1.9	3.5	20	19
E	0.9	2.1	1	0	E	1.1	2.7	2	1	E	1.0	2.5	2	2
ESE	1.6	2.8	4	1	ESE	1.3	3.1	2	1	ESE	1.2	2.9	3	1
SE	1.7	2.8	1	0	SE	2.0	3.7	2	1	SE	1.8	3.3	1	1
SSE	1.6	2.7	0	0	SSE	2.1	3.6	1	2	SSE	2.0	3.5	1	2
S	1.4	2.6	2	1	S	1.9	3.4	4	4	S	1.8	3.3	6	7
SSW	1.2	2.4	2	0	SSW	2.1	3.5	9	6	SSW	2.0	3.2	9	6
SW	1.5	2.6	7	3	SW	1.6	2.8	2	2	SW	1.4	2.6	2	2
WSW	1.7	2.9	10	8	WSW	0.8	2.0	0	0	WSW	0.6	1.9	0	0
W	1.3	2.6	10	14	W	1.2	2.3	0	1	W	1.0	2.1	0	1
WNW	1.6	2.8	21	36	WNW	1.4	2.7	3	8	WNW	1.2	2.2	0	1
NW	1.5	2.8	21	24	NW	0.8	1.8	0	0	NW	1.0	1.8	0	0
NNW	1.2	2.4	0	0	NNW	1.7	2.8	0	1	NNW	1.5	2.6	0	1
N	1.3	2.4	1	2	N	2.4	3.7	8	25	N	2.2	3.2	5	19
LOCATION 35					LOCATION 35					LOCATION 35				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.4	2.7	4	2	NNE	0.9	2.4	1	0	NNE	0.8	2.0	0	0
NE	1.1	2.1	4	1	NE	1.5	3.1	18	7	NE	1.5	2.9	19	8
ENE	1.4	2.2	2	1	ENE	1.6	2.8	5	3	ENE	1.7	2.9	9	5
E	1.5	2.4	2	1	E	1.3	2.4	1	0	E	1.4	2.7	3	1
ESE	1.5	2.5	2	0	ESE	1.3	2.4	0	0	ESE	1.4	2.4	1	0
SE	1.3	2.3	0	0	SE	1.0	2.1	0	0	SE	1.1	2.2	0	0
SSE	1.2	2.4	0	0	SSE	0.7	2.0	0	0	SSE	0.8	2.1	0	0
S	0.9	2.3	1	0	S	0.8	2.4	0	0	S	0.9	2.3	0	0
SSW	0.9	2.4	1	0	SSW	1.3	2.9	2	1	SSW	1.4	2.7	3	1
SW	1.3	2.8	9	3	SW	1.3	2.7	2	0	SW	1.4	2.6	3	1
WSW	1.7	2.8	4	2	WSW	1.9	3.5	13	10	WSW	1.5	3.0	5	3
W	1.9	3.2	34	47	W	1.9	3.7	38	53	W	1.8	3.2	26	34
WNW	1.6	2.8	12	16	WNW	1.2	3.2	16	24	WNW	1.5	3.2	28	46
NW	1.6	3.0	23	23	NW	1.2	2.6	4	1	NW	1.1	2.2	2	0
NNW	1.4	2.5	1	0	NNW	0.7	1.8	0	0	NNW	0.6	1.5	0	0
N	1.4	2.6	1	3	N	0.9	2.4	0	0	N	0.9	1.9	0	0
LOCATION 36					LOCATION 36					LOCATION 36				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	0.9	2.1	0	0	NNE	1.3	2.8	7	3	NNE	1.3	2.7	6	3
NE	1.2	2.1	4	1	NE	1.4	3.0	27	13	NE	1.3	2.7	19	8
ENE	1.3	2.3	2	1	ENE	1.2	2.2	2	1	ENE	1.2	2.2	3	1
E	1.6	2.6	3	1	E	1.4	2.4	2	1	E	1.4	2.5	3	1
ESE	1.5	2.6	2	0	ESE	1.3	2.4	1	0	ESE	1.2	2.5	2	0
SE	1.5	2.9	1	0	SE	1.1	2.4	0	0	SE	1.1	2.4	0	0
SSE	1.7	2.9	0	0	SSE	1.2	2.5	0	0	SSE	1.2	2.6	0	0
S	0.6	1.9	0	0	S	0.9	2.2	0	0	S	0.9	2.3	1	0
SSW	0.6	1.9	0	0	SSW	0.8	2.4	1	0	SSW	0.8	2.1	0	0
SW	0.8	1.9	0	0	SW	0.7	2.2	1	0	SW	0.6	1.9	0	0
WSW	1.5	2.6	2	1	WSW	1.6	3.1	13	11	WSW	1.3	2.5	1	1
W	1.8	3.3	38	45	W	1.7	3.1	31	47	W	1.7	3.3	47	62
WNW	1.9	3.1	25	33	WNW	1.1	2.8	13	22	WNW	1.3	2.9	18	24
NW	1.8	3.0	22	18	NW	0.9	2.2	3	1	NW	0.7	1.9	1	0
NNW	1.4	2.5	0	0	NNW	0.6	1.7	0	0	NNW	0.4	1.6	0	0
N	1.1	2.2	0	0	N	0.8	2.2	0	1	N	0.8	2.2	0	1

TABLE C-32
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 37					LOCATION 37				LOCATION 37			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.2	2.7	5	2	NNE	1.4	3.1	14	13	NNE	1.4	2.9	12	12
NE	1.1	1.9	2	1	NE	2.0	3.6	53	40	NE	1.9	3.4	49	38
ENE	1.4	2.4	4	2	ENE	1.6	2.9	13	13	ENE	1.5	2.9	13	14
E	1.6	2.8	5	3	E	1.2	2.6	4	4	E	1.1	2.5	4	4
ESE	1.9	2.9	4	1	ESE	1.0	2.1	0	0	ESE	1.0	2.3	1	0
SE	1.8	2.9	1	0	SE	0.9	2.0	0	0	SE	0.9	2.2	0	0
SSE	1.4	2.7	0	0	SSE	0.9	2.1	0	0	SSE	1.0	2.3	0	0
S	1.1	2.6	2	1	S	1.2	2.3	1	1	S	1.2	2.5	2	3
SSW	1.1	2.5	2	0	SSW	1.5	2.7	4	3	SSW	1.5	2.8	7	6
SW	1.4	2.8	9	3	SW	1.3	2.6	4	4	SW	1.4	2.6	8	8
WSW	1.7	2.8	5	3	WSW	1.1	2.5	1	2	WSW	1.0	2.4	1	2
W	1.7	3.1	28	40	W	0.8	1.7	0	0	W	0.7	2.2	2	6
WNW	1.3	2.7	9	14	WNW	1.1	2.5	5	19	WNW	0.8	1.9	0	1
NW	1.9	3.0	24	27	NW	0.8	1.6	0	0	NW	0.8	1.8	0	0
NNW	1.5	2.6	1	1	NNW	0.9	1.6	0	0	NNW	0.7	1.6	0	0
N	1.2	2.4	0	1	N	0.9	2.0	0	1	N	1.0	2.2	0	3
LOCATION 38					LOCATION 38					LOCATION 38				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	0.9	2.4	4	2	NNE	1.2	2.6	8	5	NNE	1.2	2.5	8	6
NE	1.1	2.4	13	6	NE	1.0	2.4	17	8	NE	0.9	2.3	15	8
ENE	1.4	2.6	10	6	ENE	1.2	2.3	6	4	ENE	1.2	2.3	7	5
E	1.5	2.7	7	5	E	1.1	2.4	4	3	E	1.0	2.3	3	2
ESE	1.7	3.2	9	3	ESE	1.5	2.7	5	1	ESE	1.5	2.6	5	2
SE	2.0	3.1	2	1	SE	1.7	2.9	2	1	SE	1.7	2.8	1	1
SSE	1.9	3.0	1	1	SSE	1.8	2.9	1	2	SSE	1.8	2.9	1	2
S	1.2	2.4	2	1	S	1.5	2.6	4	3	S	1.5	2.7	5	4
SSW	1.1	2.4	3	1	SSW	1.4	2.5	5	2	SSW	1.5	2.7	10	5
SW	1.4	2.6	8	4	SW	1.2	2.4	6	3	SW	1.2	2.6	14	9
WSW	1.5	2.5	2	2	WSW	0.8	2.0	0	0	WSW	0.7	2.1	1	1
W	1.3	2.7	15	24	W	1.1	2.8	28	49	W	0.9	2.5	14	29
WNW	1.5	2.7	19	39	WNW	0.8	2.0	1	2	WNW	0.6	1.9	1	2
NW	1.3	2.3	5	4	NW	1.1	2.3	8	7	NW	1.2	2.4	12	16
NNW	1.2	2.3	1	1	NNW	1.3	2.4	1	2	NNW	1.2	2.3	1	2
N	1.1	2.3	0	2	N	1.3	2.5	3	8	N	1.2	2.3	1	5
LOCATION 39					LOCATION 39					LOCATION 39				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	0.6	1.8	0	0	NNE	1.5	2.9	9	8	NNE	1.5	2.8	10	9
NE	0.6	1.8	4	1	NE	1.6	3.3	42	28	NE	1.5	2.9	34	23
ENE	1.4	2.7	16	10	ENE	0.6	2.4	4	3	ENE	0.8	2.1	2	2
E	0.9	2.3	4	2	E	0.8	2.1	1	1	E	0.7	2.0	1	1
ESE	1.3	3.0	9	3	ESE	1.3	2.5	2	1	ESE	1.3	2.5	3	1
SE	1.9	3.1	3	1	SE	1.9	2.9	1	0	SE	1.9	3.0	2	1
SSE	1.9	3.0	1	2	SSE	1.9	3.2	1	2	SSE	2.0	3.2	1	3
S	1.3	2.5	3	2	S	1.8	3.0	5	5	S	1.7	3.1	8	9
SSW	1.0	2.3	3	1	SSW	1.7	2.8	7	4	SSW	1.8	2.9	13	8
SW	1.3	2.3	6	2	SW	1.4	2.6	5	4	SW	1.4	2.4	6	4
WSW	1.3	2.4	3	2	WSW	0.9	2.4	1	2	WSW	0.9	2.1	0	1
W	1.3	2.5	15	23	W	1.2	2.4	5	11	W	1.1	2.3	4	11
WNW	1.4	2.6	22	41	WNW	0.9	2.3	2	7	WNW	0.7	1.9	0	1
NW	1.2	2.2	7	5	NW	1.1	2.5	8	12	NW	1.3	2.3	8	12
NNW	1.1	2.1	0	0	NNW	1.3	2.7	3	6	NNW	1.3	2.5	2	5
N	1.0	2.2	1	2	N	1.3	2.5	1	5	N	1.3	2.5	2	9

TABLE C-33
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 40					LOCATION 40				LOCATION 40			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	0.8	1.8	1	0	NNE	1.0	2.3	2	1	NNE	0.9	2.3	2	2
NE	0.7	2.0	9	3	NE	1.3	3.1	34	21	NE	1.1	2.8	29	17
ENE	0.7	1.9	2	1	ENE	1.5	3.4	26	21	ENE	1.4	3.0	18	15
E	0.7	2.0	2	1	E	1.0	2.6	5	4	E	0.9	2.7	8	7
ESE	0.9	2.3	2	0	ESE	1.7	2.8	4	1	ESE	1.6	2.8	5	2
SE	1.7	2.8	2	1	SE	2.1	3.2	2	1	SE	2.1	3.3	4	2
SSE	1.8	3.0	1	2	SSE	2.0	3.5	2	3	SSE	2.0	3.5	2	4
S	1.5	2.7	6	5	S	1.4	2.9	4	4	S	1.4	3.0	7	6
SSW	1.2	2.5	8	3	SSW	0.5	1.7	0	0	SSW	0.4	1.7	0	0
SW	1.3	2.2	4	1	SW	0.8	1.8	0	0	SW	0.8	1.9	0	0
WSW	1.2	2.4	7	5	WSW	1.0	1.9	0	0	WSW	0.9	1.9	0	0
W	1.2	2.5	18	26	W	0.9	2.0	1	1	W	0.8	2.2	3	5
WNW	1.4	2.5	20	36	WNW	1.4	2.6	10	26	WNW	0.9	2.2	3	6
NW	1.3	2.3	14	14	NW	1.3	2.4	6	6	NW	1.4	2.5	11	15
NNW	1.0	2.2	1	1	NNW	1.5	2.6	2	3	NNW	1.5	2.6	3	5
N	0.9	1.8	0	1	N	1.4	2.6	2	6	N	1.5	2.7	4	12
LOCATION 41					LOCATION 41					LOCATION 41				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.6	2.9	15	10	NNE	1.0	2.3	1	0	NNE	1.0	2.3	3	2
NE	1.1	2.5	19	10	NE	0.8	2.8	17	7	NE	0.8	2.5	18	10
ENE	0.7	1.7	1	0	ENE	1.9	3.5	22	15	ENE	1.7	3.2	26	21
E	1.1	2.4	4	3	E	1.1	2.7	3	2	E	1.0	2.7	8	7
ESE	0.7	2.0	1	0	ESE	1.7	3.0	3	1	ESE	1.6	2.8	5	2
SE	1.6	2.8	2	1	SE	1.9	3.0	1	0	SE	1.8	3.1	3	1
SSE	1.8	3.0	1	2	SSE	1.1	2.8	0	0	SSE	1.2	2.6	0	1
S	1.7	2.8	5	4	S	0.9	2.1	0	0	S	0.8	2.0	0	0
SSW	1.5	2.7	10	4	SSW	1.0	2.4	1	0	SSW	1.1	2.4	4	2
SW	1.4	2.3	4	2	SW	0.9	2.2	0	0	SW	1.1	2.3	4	2
WSW	1.0	2.4	3	3	WSW	1.7	2.9	4	3	WSW	0.8	2.1	1	1
W	1.0	2.5	11	20	W	1.9	3.0	15	21	W	1.4	2.5	12	23
WNW	1.1	2.3	6	12	WNW	1.8	3.1	24	44	WNW	1.1	2.1	1	3
NW	1.1	2.2	7	6	NW	1.3	2.6	6	4	NW	1.1	2.4	10	12
NNW	1.4	2.4	2	2	NNW	1.5	2.6	1	1	NNW	1.4	2.4	2	2
N	1.6	2.8	8	19	N	1.6	2.6	1	2	N	1.5	2.5	2	8
LOCATION 42					LOCATION 42					LOCATION 42				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.5	2.7	9	6	NNE	0.8	2.6	1	1	NNE	0.8	2.1	2	2
NE	1.1	2.2	9	4	NE	1.5	3.2	21	9	NE	1.7	3.2	46	35
ENE	0.9	2.1	2	1	ENE	1.8	3.4	12	7	ENE	2.0	3.4	31	31
E	1.4	2.7	7	5	E	1.4	3.0	4	2	E	1.4	2.8	9	11
ESE	1.0	2.4	2	0	ESE	2.1	3.3	4	1	ESE	1.9	3.0	7	4
SE	1.7	2.7	1	0	SE	1.4	2.7	0	0	SE	1.5	2.7	1	0
SSE	1.6	2.7	0	1	SSE	0.8	1.9	0	0	SSE	0.7	1.8	0	0
S	1.7	2.8	5	4	S	1.0	2.0	0	0	S	0.9	1.7	0	0
SSW	1.6	2.8	10	4	SSW	0.8	1.6	0	0	SSW	0.6	1.5	0	0
SW	1.6	2.5	9	4	SW	0.6	1.7	0	0	SW	0.6	1.4	0	0
WSW	1.2	2.7	8	8	WSW	1.1	2.2	0	0	WSW	0.4	1.2	0	0
W	1.0	2.3	6	10	W	1.9	3.2	14	18	W	0.5	1.5	0	0
WNW	1.3	2.4	9	18	WNW	2.5	3.5	29	51	WNW	1.0	2.1	1	6
NW	1.2	2.4	10	10	NW	2.0	3.1	13	11	NW	1.0	1.7	0	0
NNW	1.4	2.6	3	4	NNW	1.3	2.8	0	0	NNW	0.7	1.7	0	0
N	1.8	2.9	8	19	N	1.0	2.4	0	0	N	1.0	2.5	1	9

TABLE C-34
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 49					LOCATION 49				LOCATION 49			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.6	2.6	8	6	NNE	1.5	2.5	3	2	NNE	0.6	1.7	1	0
NE	1.5	2.7	24	14	NE	1.7	2.9	26	15	NE	0.6	1.5	4	1
ENE	1.1	2.3	5	3	ENE	1.5	3.4	25	20	ENE	0.7	1.8	3	1
E	1.5	2.7	7	6	E	1.6	3.3	14	13	E	0.7	1.9	3	1
ESE	1.1	2.2	1	0	ESE	1.3	3.0	5	2	ESE	0.7	2.0	3	0
SE	1.5	2.5	0	0	SE	0.9	2.0	0	0	SE	0.5	1.8	0	0
SSE	1.6	2.9	0	1	SSE	0.8	1.8	0	0	SSE	0.5	1.6	0	0
S	1.5	2.7	4	3	S	0.8	1.9	0	0	S	1.0	2.1	3	1
SSW	1.9	2.8	10	5	SSW	0.7	1.9	0	0	SSW	0.6	1.6	0	0
SW	1.7	2.7	12	7	SW	0.5	1.4	0	0	SW	0.2	1.3	0	0
WSW	1.0	2.7	8	9	WSW	1.0	2.0	0	0	WSW	1.1	2.1	4	2
W	0.9	1.9	1	1	W	1.0	2.2	2	3	W	1.2	2.1	13	14
WNW	1.3	2.5	12	30	WNW	1.3	2.3	2	6	WNW	1.3	2.1	17	21
NW	1.1	2.1	3	2	NW	1.6	2.9	22	38	NW	1.5	2.5	45	53
NNW	1.0	2.1	0	0	NNW	1.1	2.2	0	0	NNW	1.0	2.1	2	1
N	1.7	2.7	4	12	N	1.2	2.1	0	1	N	1.0	2.1	2	5
LOCATION 50					LOCATION 50					LOCATION 50				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.4	2.5	4	3	NNE	1.5	2.4	2	1	NNE	1.1	2.1	3	1
NE	1.4	2.6	16	9	NE	1.6	2.8	19	10	NE	1.0	2.0	8	3
ENE	1.1	2.2	3	2	ENE	1.8	3.4	22	17	ENE	1.0	2.4	10	6
E	1.4	2.6	4	4	E	1.9	3.5	18	15	E	1.3	2.7	12	8
ESE	1.2	2.4	1	0	ESE	1.5	2.7	3	1	ESE	1.2	2.7	7	2
SE	1.3	2.3	0	0	SE	0.8	1.9	0	0	SE	0.6	1.7	0	0
SSE	1.5	2.7	0	1	SSE	1.0	2.5	0	0	SSE	0.8	2.2	0	0
S	1.3	2.5	1	1	S	1.2	2.8	3	2	S	1.2	2.8	8	6
SSW	2.0	2.9	9	5	SSW	0.9	1.9	0	0	SSW	0.2	1.5	0	0
SW	2.0	3.1	29	20	SW	0.6	1.7	0	0	SW	0.1	1.4	0	0
WSW	1.2	2.8	7	9	WSW	1.1	2.4	1	1	WSW	1.0	2.3	4	3
W	0.9	1.8	0	0	W	1.1	2.7	11	19	W	1.0	2.3	13	19
WNW	1.1	2.1	1	2	WNW	1.1	2.2	1	2	WNW	1.1	2.2	7	12
NW	1.2	2.9	23	41	NW	1.5	2.9	21	30	NW	1.3	2.5	23	28
NNW	1.0	2.0	0	0	NNW	0.9	2.2	0	0	NNW	1.0	2.1	1	1
N	1.3	2.4	1	3	N	1.4	2.4	0	2	N	1.3	2.4	4	9
LOCATION 51					LOCATION 51					LOCATION 51				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.7	2.8	9	5	NNE	1.8	3.3	5	2	NNE	1.2	2.1	2	1
NE	1.3	2.5	15	7	NE	1.6	3.8	31	16	NE	1.1	2.4	19	7
ENE	0.9	2.1	2	1	ENE	1.3	3.7	13	8	ENE	1.0	2.3	6	3
E	1.5	2.7	6	5	E	1.5	3.5	6	4	E	1.2	2.4	6	3
ESE	1.1	2.5	2	0	ESE	0.6	1.5	0	0	ESE	0.6	1.5	0	0
SE	1.6	2.6	0	0	SE	0.5	1.4	0	0	SE	0.5	1.3	0	0
SSE	1.6	2.8	0	1	SSE	0.5	1.5	0	0	SSE	0.3	1.2	0	0
S	1.6	2.8	4	3	S	0.8	1.8	0	0	S	0.6	1.5	0	0
SSW	1.7	2.8	8	3	SSW	0.6	1.3	0	0	SSW	0.1	1.3	0	0
SW	1.7	2.6	8	3	SW	0.6	1.7	0	0	SW	0.1	1.2	0	0
WSW	1.3	2.7	6	6	WSW	1.9	3.1	1	1	WSW	0.8	1.9	0	0
W	1.0	2.4	6	9	W	2.2	3.6	20	28	W	1.6	2.5	15	17
WNW	1.2	2.7	17	34	WNW	2.2	3.6	22	40	WNW	1.9	2.8	41	63
NW	1.2	2.4	8	7	NW	1.0	2.6	1	0	NW	1.4	2.3	9	5
NNW	1.4	2.7	3	4	NNW	1.1	2.6	0	0	NNW	0.4	1.4	0	0
N	1.9	2.8	4	11	N	1.3	2.4	0	0	N	1.2	2.2	1	2

TABLE C-37
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 52					LOCATION 52				LOCATION 52			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.5	2.6	5	3	NNE	1.1	2.1	1	0	NNE	1.2	2.5	5	2
NE	1.3	2.4	12	6	NE	1.0	2.0	3	0	NE	0.9	2.1	8	2
ENE	1.1	2.1	2	1	ENE	1.1	2.2	2	1	ENE	1.3	2.3	5	2
E	1.4	2.7	7	5	E	0.9	2.0	0	0	E	1.3	2.3	3	1
ESE	1.2	2.4	2	0	ESE	0.8	1.8	0	0	ESE	0.8	1.7	0	0
SE	1.5	2.5	0	0	SE	0.7	1.6	0	0	SE	0.6	1.4	0	0
SSE	1.6	2.6	0	1	SSE	0.9	1.9	0	0	SSE	0.3	1.3	0	0
S	1.5	3.0	6	5	S	1.0	2.2	0	0	S	0.7	1.6	0	0
SSW	1.9	2.9	9	4	SSW	0.8	1.8	0	0	SSW	0.1	1.2	0	0
SW	1.8	2.8	17	10	SW	0.5	1.5	0	0	SW	0.1	1.2	0	0
WSW	1.5	2.9	13	14	WSW	1.7	3.0	8	4	WSW	1.4	2.7	8	5
W	0.7	1.9	0	0	W	1.7	2.9	19	19	W	1.4	2.8	25	32
WNW	1.4	2.6	13	29	WNW	1.7	3.1	31	41	WNW	1.4	2.6	17	25
NW	1.4	2.5	12	15	NW	1.8	3.2	34	33	NW	1.6	2.8	27	28
NNW	1.2	2.2	0	0	NNW	1.4	2.5	1	0	NNW	1.1	2.2	0	0
N	1.6	2.6	2	7	N	1.3	2.3	0	1	N	1.1	2.3	1	2
LOCATION 53					LOCATION 53					LOCATION 53				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.4	2.6	3	3	NNE	1.0	2.0	1	0	NNE	0.1	1.2	0	0
NE	1.9	3.1	26	19	NE	1.3	2.4	13	6	NE	0.3	1.4	3	1
ENE	1.8	3.2	16	15	ENE	1.0	2.4	6	3	ENE	0.2	1.5	2	1
E	2.1	3.5	15	16	E	1.4	2.9	12	9	E	0.5	1.5	1	0
ESE	1.2	2.2	0	0	ESE	0.9	2.3	1	0	ESE	0.4	1.8	2	0
SE	1.0	1.8	0	0	SE	1.0	2.2	0	0	SE	0.6	2.0	1	0
SSE	0.9	2.1	0	0	SSE	1.1	2.1	0	0	SSE	1.0	2.3	1	2
S	1.1	2.4	0	1	S	1.1	2.2	1	1	S	1.0	2.2	7	5
SSW	2.0	2.9	5	3	SSW	1.6	2.7	7	3	SSW	0.9	2.2	15	7
SW	2.1	3.3	21	18	SW	1.0	2.2	2	1	SW	0.1	1.6	2	0
WSW	1.8	3.2	12	21	WSW	1.4	3.0	19	18	WSW	0.9	2.3	26	25
W	0.7	2.2	1	2	W	1.4	2.7	20	33	W	1.0	2.0	25	39
WNW	0.5	1.8	0	0	WNW	1.1	2.4	8	14	WNW	0.8	1.8	8	13
NW	0.7	1.5	0	0	NW	1.1	2.4	8	7	NW	0.7	1.7	8	6
NNW	0.8	2.0	0	0	NNW	1.0	2.3	1	1	NNW	0.5	1.4	0	0
N	1.1	2.4	0	3	N	1.1	2.4	1	3	N	0.5	1.2	0	0
LOCATION 54					LOCATION 54					LOCATION 54				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.1	2.5	3	2	NNE	1.3	2.4	0	0	NNE	0.6	1.6	0	0
NE	1.8	2.8	23	13	NE	0.8	2.0	1	0	NE	0.6	1.6	1	0
ENE	1.8	3.0	14	11	ENE	2.2	3.4	11	6	ENE	0.9	2.0	1	0
E	1.7	2.7	6	4	E	2.2	3.7	10	6	E	1.4	2.3	2	0
ESE	1.7	2.8	3	1	ESE	2.4	3.7	6	1	ESE	0.1	1.7	0	0
SE	1.6	2.6	0	0	SE	1.9	2.9	0	0	SE	0.1	1.2	0	0
SSE	1.0	2.2	0	0	SSE	1.4	2.6	0	0	SSE	0.1	1.3	0	0
S	1.0	2.3	1	1	S	1.1	2.7	1	0	S	0.7	1.8	0	0
SSW	1.7	2.6	3	1	SSW	1.2	3.0	2	0	SSW	0.5	1.7	0	0
SW	1.7	2.7	9	5	SW	1.0	2.4	0	0	SW	0.1	1.2	0	0
WSW	1.7	2.8	6	6	WSW	1.4	2.7	0	0	WSW	0.1	1.6	0	0
W	1.6	2.8	14	27	W	2.0	3.3	11	12	W	1.1	2.6	9	8
WNW	1.5	2.6	8	18	WNW	2.4	3.8	36	57	WNW	1.6	3.0	31	41
NW	1.3	2.5	7	7	NW	1.7	3.4	16	13	NW	1.6	3.0	34	33
NNW	1.3	2.6	1	2	NNW	2.1	3.6	5	4	NNW	2.1	3.4	22	16
N	1.0	2.3	0	2	N	1.1	2.5	0	0	N	1.0	2.4	0	1

TABLE C-38
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 55					LOCATION 55				LOCATION 55			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.0	2.2	1	1	NNE	1.6	2.8	4	2	NNE	0.5	1.4	0	0
NE	1.6	2.7	21	11	NE	0.8	1.9	1	0	NE	0.3	1.3	1	0
ENE	1.7	2.9	14	10	ENE	1.1	2.7	6	3	ENE	0.7	2.0	5	5
E	1.6	2.6	4	3	E	0.9	3.0	6	3	E	1.0	2.5	11	12
ESE	1.6	2.6	2	0	ESE	0.8	1.9	0	0	ESE	0.7	1.4	0	0
SE	1.4	2.5	0	0	SE	0.7	1.4	0	0	SE	0.3	1.4	0	0
SSE	1.1	2.3	0	0	SSE	0.6	1.6	0	0	SSE	0.5	1.4	0	0
S	1.3	2.5	2	1	S	1.0	2.3	0	0	S	0.3	1.6	0	0
SSW	1.6	2.5	2	1	SSW	1.1	3.3	11	4	SSW	1.4	3.1	42	31
SW	1.7	2.6	7	3	SW	1.3	3.1	11	4	SW	1.0	2.6	31	27
WSW	1.6	2.9	8	8	WSW	1.5	2.9	3	2	WSW	1.0	2.2	5	10
W	1.6	2.8	17	29	W	1.4	3.0	13	17	W	0.5	1.5	0	1
WNW	1.4	2.5	7	15	WNW	1.9	3.3	26	45	WNW	0.5	1.5	0	0
NW	1.2	2.4	6	6	NW	1.3	3.1	19	19	NW	0.6	1.6	1	1
NNW	1.7	2.9	6	8	NNW	1.2	2.8	1	1	NNW	0.8	2.2	2	6
N	1.2	2.5	1	4	N	1.0	2.3	0	0	N	0.6	1.9	1	5
LOCATION 56					LOCATION 56					LOCATION 56				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.2	2.5	4	2	NNE	1.2	2.2	5	3	NNE	0.5	1.6	2	1
NE	1.5	2.7	21	11	NE	0.7	1.7	5	1	NE	0.3	1.3	3	1
ENE	1.9	3.0	17	12	ENE	0.9	2.1	7	4	ENE	0.1	1.2	0	0
E	1.5	2.5	3	2	E	0.5	1.4	0	0	E	0.4	1.3	0	0
ESE	1.3	2.4	2	0	ESE	0.7	1.5	0	0	ESE	0.6	1.4	0	0
SE	0.9	2.1	0	0	SE	0.5	1.3	0	0	SE	0.4	1.6	0	0
SSE	1.1	2.4	0	0	SSE	0.1	1.5	0	0	SSE	0.1	1.6	0	0
S	1.5	2.4	1	1	S	0.5	1.5	0	0	S	0.6	1.7	2	1
SSW	1.6	2.5	3	1	SSW	0.9	2.1	4	1	SSW	0.8	1.8	4	1
SW	1.7	2.6	7	4	SW	1.2	2.4	18	8	SW	0.8	1.8	9	3
WSW	1.4	2.8	7	8	WSW	0.8	2.1	2	2	WSW	0.3	1.9	6	4
W	1.4	2.7	15	27	W	0.8	2.4	23	33	W	0.6	1.8	10	12
WNW	1.6	2.5	7	14	WNW	1.1	2.3	16	28	WNW	0.8	1.9	16	24
NW	1.1	2.3	5	4	NW	1.1	2.2	16	16	NW	0.9	2.0	33	39
NNW	1.5	2.7	3	4	NNW	1.1	2.3	3	3	NNW	1.0	2.1	10	8
N	1.6	2.7	3	9	N	0.8	2.0	1	3	N	0.6	1.8	3	6
LOCATION 57					LOCATION 57					LOCATION 57				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.2	2.4	3	2	NNE	1.3	2.5	1	0	NNE	0.6	1.5	0	0
NE	1.2	2.4	14	6	NE	0.8	1.8	1	0	NE	0.4	1.3	0	0
ENE	1.6	2.6	9	6	ENE	0.9	2.1	1	0	ENE	0.6	1.5	0	0
E	1.5	2.5	4	3	E	0.9	2.2	0	0	E	0.7	1.8	1	0
ESE	1.4	2.4	2	0	ESE	0.7	1.8	0	0	ESE	0.4	1.4	0	0
SE	1.0	2.1	0	0	SE	1.0	1.9	0	0	SE	0.3	1.3	0	0
SSE	1.2	2.4	0	0	SSE	0.8	1.8	0	0	SSE	0.4	1.3	0	0
S	1.6	2.7	3	2	S	1.0	2.2	0	0	S	0.9	1.8	0	0
SSW	1.7	2.6	4	2	SSW	1.6	3.1	5	2	SSW	1.3	2.4	5	1
SW	1.8	2.7	12	6	SW	1.8	3.6	28	13	SW	0.9	2.2	3	1
WSW	1.5	2.9	12	12	WSW	1.5	3.4	11	9	WSW	0.8	2.1	1	0
W	1.5	2.7	18	31	W	1.3	3.2	17	24	W	0.6	2.0	3	2
WNW	1.5	2.4	7	13	WNW	1.6	3.2	19	33	WNW	1.5	2.7	33	44
NW	0.9	2.4	8	8	NW	1.4	3.1	17	18	NW	1.5	2.8	38	38
NNW	1.4	2.5	2	2	NNW	1.3	2.7	0	0	NNW	1.5	2.8	12	7
N	1.5	2.6	2	7	N	1.0	2.3	0	0	N	1.4	2.5	4	6

TABLE C-39
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS					PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEVICES			
LOCATION 58					LOCATION 58				LOCATION 58			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.2	2.5	8	6	NNE	1.0	2.4	1	1	NNE	0.6	1.6	0	0
NE	0.9	2.1	10	5	NE	0.9	2.0	2	1	NE	0.6	1.7	3	2
ENE	1.3	2.5	11	8	ENE	1.2	2.7	6	6	ENE	0.2	1.4	0	0
E	1.6	2.8	12	10	E	1.2	2.8	5	5	E	0.5	1.9	1	1
ESE	1.4	2.5	4	1	ESE	0.9	2.3	1	0	ESE	0.7	1.9	1	0
SE	1.2	2.2	0	0	SE	0.9	1.9	0	0	SE	0.6	1.6	0	0
SSE	1.1	2.3	0	0	SSE	0.9	2.3	0	0	SSE	0.6	1.9	0	0
S	1.4	2.4	3	2	S	1.2	2.6	1	2	S	1.0	2.4	3	4
SSW	1.5	2.4	4	2	SSW	1.9	3.7	27	19	SSW	1.8	3.3	40	31
SW	1.4	2.4	9	5	SW	1.9	3.5	44	37	SW	1.3	2.9	45	44
WSW	1.4	2.7	11	13	WSW	1.4	2.9	5	9	WSW	0.7	2.2	2	4
W	1.2	2.3	10	18	W	1.1	2.5	5	13	W	0.8	1.9	2	8
WNW	0.9	1.7	0	0	WNW	1.0	2.1	0	1	WNW	0.7	1.5	0	0
NW	0.7	2.0	4	3	NW	0.7	1.9	0	0	NW	0.6	1.9	3	4
NNW	1.3	2.6	7	9	NNW	1.1	2.2	0	0	NNW	0.8	1.7	0	0
N	1.5	2.7	6	17	N	1.2	2.5	1	4	N	0.7	1.7	0	1
LOCATION 59					LOCATION 59					LOCATION 59				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	0.6	2.0	1	0	NNE	0.8	2.0	0	0	NNE	0.5	1.5	0	0
NE	0.8	2.2	8	4	NE	0.8	2.0	1	1	NE	0.5	1.3	1	0
ENE	1.3	2.8	13	10	ENE	1.6	3.3	14	13	ENE	0.4	1.8	2	2
E	1.9	3.2	17	15	E	1.5	3.1	6	6	E	0.6	2.1	4	5
ESE	1.7	3.0	7	3	ESE	0.8	2.6	1	0	ESE	0.7	2.1	2	1
SE	1.6	2.7	1	0	SE	0.9	1.8	0	0	SE	0.6	1.8	0	0
SSE	1.2	2.4	0	0	SSE	0.8	2.1	0	0	SSE	0.7	1.8	0	0
S	1.3	2.7	3	3	S	1.1	3.0	3	3	S	1.0	2.3	3	4
SSW	1.4	2.4	2	1	SSW	2.0	3.7	19	13	SSW	1.6	3.3	49	38
SW	1.4	2.4	4	2	SW	2.2	3.8	44	37	SW	0.9	2.7	35	33
WSW	1.5	2.9	14	16	WSW	1.6	3.0	5	8	WSW	0.7	1.7	0	0
W	1.2	2.7	16	29	W	1.4	2.6	3	9	W	0.6	1.9	2	7
WNW	1.1	2.1	2	3	WNW	1.3	2.6	3	10	WNW	0.5	1.5	0	0
NW	1.0	2.1	3	2	NW	0.7	2.2	1	0	NW	0.6	1.7	1	1
NNW	1.6	2.9	8	11	NNW	1.0	2.1	0	0	NNW	0.9	2.0	1	2
N	1.0	2.2	0	2	N	0.9	2.2	0	1	N	0.8	2.0	1	5
LOCATION 60					LOCATION 60					LOCATION 60				
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT FALL	WIN
NNE	1.5	2.6	5	4	NNE	1.3	2.4	3	1	NNE	1.5	2.8	12	7
NE	1.5	2.6	17	9	NE	1.0	2.2	8	2	NE	1.1	2.1	8	3
ENE	1.3	2.6	8	6	ENE	1.7	2.9	13	8	ENE	1.6	2.7	13	8
E	1.4	2.5	4	3	E	1.9	3.0	11	7	E	1.7	2.7	9	6
ESE	1.3	2.4	2	0	ESE	1.4	2.6	3	0	ESE	1.1	2.3	2	0
SE	1.4	2.3	0	0	SE	0.9	2.1	0	0	SE	0.5	1.6	0	0
SSE	1.5	2.5	0	0	SSE	0.8	1.8	0	0	SSE	0.7	1.8	0	0
S	1.2	2.5	2	2	S	0.9	2.3	1	1	S	0.7	2.2	1	0
SSW	1.7	2.9	10	5	SSW	0.6	1.5	0	0	SSW	0.6	1.6	0	0
SW	1.9	2.8	14	9	SW	0.7	1.6	0	0	SW	0.3	1.3	0	0
WSW	1.8	2.9	11	13	WSW	1.7	2.9	10	8	WSW	1.3	2.6	8	6
W	0.8	2.4	4	8	W	1.7	2.9	24	33	W	1.4	2.7	22	31
WNW	1.1	2.3	3	6	WNW	1.4	2.6	11	16	WNW	1.2	2.3	7	10
NW	1.3	2.7	16	24	NW	0.6	2.4	7	5	NW	0.7	2.0	2	1
NNW	0.9	2.4	1	1	NNW	0.9	2.3	0	0	NNW	0.8	2.4	2	2
N	1.4	2.7	2	9	N	1.7	3.1	10	18	N	1.8	3.1	14	26

TABLE C-40
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS			PROPOSED RUGGLES CENTER			PROPOSED RUGGLES CENTER WITH REMEDIAL DEIVCES		
LOCATION 1			**LOCATION 1**			**LOCATION 1**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.5	2.1	5	NNE	1.8	2.3	2	NNE	0.3	0.6	0
NE	1.4	2.0	13	NE	0.9	1.4	0	NE	0.2	0.6	0
ENE	1.7	2.3	13	ENE	1.1	1.7	0	ENE	0.1	0.7	0
E	1.4	2.0	4	E	0.8	1.4	0	E	0.1	0.6	0
ESE	1.2	1.8	1	ESE	0.8	1.3	0	ESE	0.1	0.2	0
SE	0.9	1.5	0	SE	0.9	1.5	0	SE	0.5	1.1	0
SSE	1.2	1.8	0	SSE	1.3	2.0	0	SSE	1.0	1.4	0
S	1.6	2.2	4	S	2.2	2.9	4	S	1.4	1.8	2
SSW	1.7	2.2	6	SSW	2.4	3.1	11	SSW	1.7	2.2	12
SW	1.8	2.3	20	SW	2.1	2.7	9	SW	1.8	2.4	39
WSW	1.3	2.0	5	WSW	1.6	2.4	3	WSW	1.5	2.1	19
W	1.1	1.9	9	W	1.3	2.3	7	W	1.3	1.7	10
WNW	1.3	1.8	10	WNW	1.5	2.2	5	WNW	1.3	1.8	18
NW	1.1	1.6	2	NW	2.0	2.7	20	NW	0.7	1.3	1
NNW	1.2	1.8	0	NNW	2.5	3.3	26	NNW	0.1	0.6	0
N	1.5	2.1	7	N	2.3	3.1	14	N	0.5	0.8	0
LOCATION 2			**LOCATION 2**			**LOCATION 2**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.5	2.0	2	NNE	0.6	0.9	0	NNE	0.4	0.7	0
NE	1.6	2.2	13	NE	0.3	0.6	0	NE	0.1	0.5	0
ENE	1.8	2.3	9	ENE	0.4	0.8	0	ENE	0.1	0.7	0
E	1.4	2.0	2	E	0.5	0.8	0	E	0.1	1.2	3
ESE	1.0	1.6	0	ESE	0.7	1.1	0	ESE	0.3	0.6	0
SE	0.8	1.3	0	SE	1.1	1.7	0	SE	0.1	0.6	0
SSE	1.2	1.8	0	SSE	1.1	1.8	0	SSE	0.5	0.9	0
S	1.6	2.2	2	S	1.2	1.9	1	S	0.6	1.0	0
SSW	1.8	2.3	5	SSW	0.9	1.5	0	SSW	0.8	1.0	0
SW	1.9	2.4	12	SW	0.1	1.0	0	SW	0.8	1.5	14
WSW	1.3	1.9	2	WSW	0.2	1.2	0	WSW	0.9	1.7	32
W	1.5	2.2	20	W	0.4	1.4	0	W	0.8	1.5	40
WNW	1.6	2.2	24	WNW	1.7	2.4	90	WNW	0.1	1.3	14
NW	1.3	1.8	2	NW	1.1	1.8	9	NW	0.1	0.7	0
NNW	1.4	2.0	1	NNW	0.9	1.4	0	NNW	0.4	0.9	0
N	1.7	2.3	7	N	0.5	1.0	0	N	0.4	0.8	0
LOCATION 3			**LOCATION 3**			**LOCATION 3**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.5	2.1	3	NNE	1.0	1.6	0	NNE	0.2	0.7	0
NE	1.7	2.2	12	NE	0.2	0.8	0	NE	0.2	0.6	0
ENE	1.4	2.0	3	ENE	0.5	1.1	0	ENE	0.1	0.6	0
E	1.6	2.2	4	E	1.3	1.9	0	E	0.1	0.6	0
ESE	0.8	1.4	0	ESE	1.5	2.3	0	ESE	0.4	0.9	0
SE	0.7	1.2	0	SE	1.6	2.4	0	SE	0.1	1.0	0
SSE	1.1	1.7	0	SSE	1.1	1.8	0	SSE	0.3	1.2	0
S	1.5	2.1	1	S	1.0	1.8	0	S	0.7	1.3	0
SSW	1.9	2.4	6	SSW	0.9	1.7	0	SSW	0.9	1.3	0
SW	1.9	2.4	12	SW	1.8	2.5	4	SW	1.3	2.0	12
WSW	1.3	2.0	2	WSW	1.7	2.6	6	WSW	1.5	2.4	33
W	1.6	2.4	27	W	2.0	2.9	33	W	1.4	2.3	58
WNW	1.6	2.2	20	WNW	2.3	3.0	55	WNW	0.5	0.9	0
NW	1.2	1.7	1	NW	1.3	2.1	2	NW	0.1	0.7	0
NNW	1.5	2.1	1	NNW	1.0	1.5	0	NNW	0.7	1.1	0
N	1.7	2.3	6	N	1.0	1.5	0	N	0.3	0.7	0

TABLE C-41
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS			PROPOSED RUGGLES CENTER			PROPOSED RUGGLES CENTER WITH REMEDIAL DEIVCES		
LOCATION 4			**LOCATION 4**			**LOCATION 4**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.6	2.3	9	0.9	1.7	1	0.7	1.4	0
NE	0.8	1.4	1	0.7	1.3	0	0.6	1.2	0
ENE	0.6	1.1	0	0.6	1.2	0	0.7	1.4	0
E	0.8	1.2	0	0.9	1.6	1	1.0	1.6	1
ESE	0.9	1.3	0	1.2	1.8	1	1.3	1.8	1
SE	0.8	1.3	0	1.1	1.6	0	1.2	1.6	0
SSE	1.2	1.9	0	0.7	1.4	0	1.0	1.6	0
S	1.7	2.3	5	1.3	1.9	1	1.1	1.7	0
SSW	2.0	2.5	16	1.6	2.0	3	1.4	1.9	2
SW	1.7	2.2	10	1.4	1.9	4	1.3	1.8	2
WSW	1.2	1.7	1	1.0	1.6	1	1.2	1.7	1
W	1.1	1.7	2	1.3	2.1	26	1.4	2.1	24
WNW	1.4	2.0	14	1.6	2.3	57	1.7	2.3	60
NW	1.5	2.0	12	1.2	1.8	5	1.3	1.8	7
NNW	2.0	2.5	18	1.1	1.7	0	1.2	1.7	0
N	1.8	2.4	12	1.0	1.7	1	0.9	1.5	0
LOCATION 5			**LOCATION 5**			**LOCATION 5**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.5	2.0	4	1.6	2.2	3	1.0	1.4	3
NE	1.4	2.0	11	1.0	1.5	1	0.8	1.2	2
ENE	1.8	2.4	13	0.9	1.6	0	0.6	0.9	0
E	1.4	1.9	2	0.9	1.6	0	0.5	0.9	0
ESE	1.3	1.9	1	0.9	1.5	0	0.1	0.2	0
SE	1.0	1.5	0	1.2	1.9	0	0.8	1.5	1
SSE	1.4	1.9	0	1.4	2.1	0	1.1	1.8	2
S	1.6	2.1	2	1.8	2.3	2	1.0	1.7	7
SSW	1.6	2.1	3	1.5	2.0	1	1.0	1.6	5
SW	1.7	2.1	8	1.3	1.8	0	1.0	1.5	7
WSW	1.2	1.9	2	0.8	1.7	0	1.2	1.8	24
W	1.1	1.9	9	0.6	1.5	0	1.0	1.3	6
WNW	1.6	2.2	29	1.3	1.8	2	1.1	1.4	15
NW	1.5	2.1	16	1.7	2.4	26	1.0	1.5	14
NNW	0.9	1.4	0	2.3	3.1	42	1.2	1.6	7
N	1.1	1.6	0	2.2	2.9	23	1.1	1.6	7
LOCATION 6			**LOCATION 6**			**LOCATION 6**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.5	2.1	2	1.0	1.8	0	1.1	1.7	1
NE	1.6	2.1	10	0.8	1.2	0	0.6	1.3	0
ENE	1.7	2.2	6	0.9	1.4	0	0.4	1.0	0
E	1.5	2.0	2	0.8	1.3	0	0.4	1.1	0
ESE	1.0	1.6	0	1.0	1.9	0	0.6	1.6	0
SE	1.0	1.4	0	1.7	2.4	0	1.4	2.1	1
SSE	1.4	1.9	0	1.4	2.1	0	1.4	2.0	0
S	1.7	2.2	2	1.6	2.1	0	1.4	1.8	1
SSW	1.7	2.2	2	1.1	1.7	0	1.2	1.6	0
SW	1.8	2.3	9	0.8	1.4	0	0.9	1.5	0
WSW	1.1	1.8	0	0.9	1.9	0	0.9	2.0	4
W	1.5	2.3	21	0.9	1.6	0	1.1	1.9	6
WNW	1.8	2.4	35	1.6	2.1	4	1.3	1.9	7
NW	1.4	2.0	6	2.1	2.9	42	1.5	2.1	16
NNW	1.1	1.6	0	2.7	3.5	40	2.2	2.9	41
N	1.6	2.2	4	2.1	3.0	13	1.9	2.7	23

TABLE C-42
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS			PROPOSED RUGGLES CENTER			PROPOSED RUGGLES CENTER WITH REMEDIAL DEIVCES		
LOCATION 7			**LOCATION 7**			**LOCATION 7**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.6	2.2	4	NNE	0.9	1.6	0	NNE	0.9	1.5	0
NE	1.6	2.1	10	NE	0.7	1.0	0	NE	0.4	0.8	0
ENE	1.3	2.1	4	ENE	0.8	1.3	0	ENE	0.8	1.6	2
E	1.2	1.8	1	E	1.4	1.9	1	E	1.6	2.3	11
ESE	1.0	1.4	0	ESE	1.6	2.2	1	ESE	2.0	2.6	12
SE	1.3	1.8	0	SE	1.4	1.8	0	SE	1.5	1.9	1
SSE	1.6	2.1	0	SSE	1.6	2.1	0	SSE	1.5	2.0	1
S	1.7	2.1	2	S	1.5	2.0	1	S	1.4	1.9	2
SSW	1.7	2.2	2	SSW	1.4	1.9	0	SSW	1.3	1.7	0
SW	1.8	2.3	8	SW	1.4	1.9	1	SW	1.1	1.7	1
WSW	1.3	2.1	3	WSW	1.0	1.7	0	WSW	0.8	1.5	0
W	1.6	2.3	25	W	1.5	2.2	10	W	1.2	1.8	9
WNW	1.4	2.2	19	WNW	1.6	2.4	27	WNW	1.3	1.9	19
NW	1.7	2.3	18	NW	1.9	2.4	23	NW	1.4	1.9	15
NNW	1.4	2.0	1	NNW	2.1	2.8	18	NNW	1.1	1.9	2
N	1.5	2.1	3	N	2.0	2.8	18	N	1.6	2.6	25
LOCATION 8			**LOCATION 8**			**LOCATION 8**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.7	2.2	3	NNE	1.0	1.5	0	NNE	0.7	1.1	0
NE	1.6	2.2	9	NE	0.9	1.4	0	NE	0.7	1.2	0
ENE	1.1	1.7	1	ENE	1.5	2.2	3	ENE	1.4	2.0	6
E	1.3	2.0	2	E	1.8	2.4	5	E	1.6	2.2	6
ESE	0.8	1.2	0	ESE	2.1	2.7	4	ESE	1.9	2.5	6
SE	0.9	1.4	0	SE	2.0	2.8	2	SE	1.7	2.4	2
SSE	1.4	2.0	0	SSE	1.5	2.0	0	SSE	1.4	1.9	0
S	1.7	2.3	2	S	1.3	1.8	0	S	1.1	1.6	0
SSW	1.8	2.3	3	SSW	1.0	1.5	0	SSW	1.1	1.5	0
SW	1.8	2.3	7	SW	1.0	1.5	0	SW	1.1	1.6	0
WSW	1.3	2.0	1	WSW	1.1	1.8	0	WSW	1.2	1.8	1
W	1.7	2.4	23	W	1.6	2.3	12	W	1.5	2.2	30
WNW	1.7	2.4	34	WNW	1.9	2.6	38	WNW	1.6	2.1	29
NW	1.6	2.2	10	NW	1.9	2.7	35	NW	1.3	1.9	10
NNW	1.5	2.0	0	NNW	1.2	2.1	1	NNW	1.5	2.3	8
N	1.9	2.4	7	N	0.9	1.4	0	N	0.7	1.2	0
LOCATION 9			**LOCATION 9**			**LOCATION 9**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.7	2.3	8	NNE	0.9	1.4	0	NNE	0.7	1.3	0
NE	0.7	1.4	1	NE	0.8	1.3	0	NE	0.7	1.3	0
ENE	0.6	1.1	0	ENE	0.6	1.2	0	ENE	0.6	1.2	0
E	0.5	1.0	0	E	0.8	1.4	0	E	0.9	1.4	0
ESE	0.8	1.1	0	ESE	0.8	1.4	0	ESE	0.9	1.4	0
SE	0.9	1.4	0	SE	0.7	1.3	0	SE	0.8	1.2	0
SSE	1.4	2.0	0	SSE	1.2	1.8	0	SSE	1.1	1.7	0
S	1.5	2.1	2	S	1.2	1.8	1	S	1.1	1.7	0
SSW	1.8	2.3	5	SSW	1.4	1.9	1	SSW	1.3	1.8	1
SW	1.5	2.0	3	SW	1.3	1.8	1	SW	1.4	1.9	3
WSW	1.3	1.8	1	WSW	1.2	1.7	1	WSW	1.3	1.9	3
W	1.5	2.1	15	W	1.6	2.3	30	W	1.7	2.3	40
WNW	1.5	2.2	28	WNW	1.8	2.4	53	WNW	1.6	2.3	48
NW	1.6	2.1	13	NW	1.5	2.0	12	NW	1.2	1.8	5
NNW	1.9	2.5	12	NNW	1.0	1.6	0	NNW	1.0	1.7	0
N	1.9	2.5	13	N	1.2	1.8	1	N	1.0	1.6	0

TABLE C-43
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS				PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEIVCES			
LOCATION 10				LOCATION 10				LOCATION 10			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.5	2.1	3	NNE	0.8	1.2	1	NNE	0.6	0.9	0
NE	1.7	2.3	15	NE	0.7	1.1	2	NE	0.5	0.9	1
ENE	1.5	2.1	5	ENE	0.7	0.9	0	ENE	0.4	0.7	0
E	1.6	2.2	5	E	0.9	1.3	2	E	0.2	0.6	0
ESE	0.8	1.4	0	ESE	0.6	1.1	0	ESE	0.1	1.3	3
SE	0.2	0.8	0	SE	0.6	1.3	0	SE	0.5	1.2	0
SSE	1.0	1.6	0	SSE	0.1	1.5	1	SSE	0.6	1.2	0
S	1.5	2.1	1	S	0.1	1.2	1	S	0.7	1.2	1
SSW	2.0	2.5	8	SSW	1.0	1.7	13	SSW	1.0	1.6	19
SW	2.0	2.5	18	SW	1.2	1.9	50	SW	0.9	1.7	60
WSW	1.4	2.0	2	WSW	0.9	1.7	20	WSW	0.6	1.4	17
W	1.6	2.3	26	W	0.7	1.2	4	W	0.3	0.9	0
WNW	1.4	2.0	11	WNW	0.6	1.0	0	WNW	0.2	0.7	0
NW	1.2	1.7	1	NW	0.8	1.2	2	NW	0.1	0.6	0
NNW	1.5	2.0	1	NNW	0.8	1.1	0	NNW	0.1	0.6	0
N	1.5	2.1	3	N	0.8	1.2	1	N	0.1	0.7	0
LOCATION 11				LOCATION 11				LOCATION 11			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.5	2.0	3	NNE	1.1	1.7	1	NNE	0.9	1.4	0
NE	1.8	2.3	17	NE	1.1	1.6	2	NE	1.0	1.6	2
ENE	1.5	2.1	5	ENE	2.0	2.5	17	ENE	2.1	2.5	19
E	1.6	2.2	5	E	2.0	2.6	17	E	1.9	2.5	15
ESE	0.7	1.3	0	ESE	1.9	2.7	11	ESE	1.9	2.6	9
SE	0.3	1.0	0	SE	1.6	2.5	3	SE	1.6	2.5	2
SSE	0.8	1.4	0	SSE	0.9	1.8	0	SSE	0.6	1.5	0
S	1.4	2.0	1	S	1.1	1.9	1	S	1.0	1.7	0
SSW	2.0	2.5	9	SSW	1.8	2.5	13	SSW	1.5	2.3	8
SW	2.0	2.5	19	SW	1.6	2.6	32	SW	1.8	2.7	43
WSW	1.4	2.1	4	WSW	0.9	1.9	2	WSW	1.0	1.9	2
W	1.6	2.3	24	W	1.0	1.6	1	W	0.8	1.4	0
WNW	1.3	1.9	8	WNW	0.7	1.2	0	WNW	0.8	1.2	0
NW	1.1	1.7	1	NW	0.7	1.1	0	NW	0.7	1.0	0
NNW	1.5	2.1	2	NNW	0.8	1.1	0	NNW	0.6	1.0	0
N	1.4	2.0	2	N	1.0	1.4	0	N	0.8	1.3	0
LOCATION 12				LOCATION 12				LOCATION 12			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.4	1.9	2	NNE	0.8	1.4	0	NNE	0.5	1.0	0
NE	1.6	2.2	13	NE	0.7	1.3	1	NE	0.7	1.4	1
ENE	1.7	2.2	7	ENE	1.8	2.3	20	ENE	2.1	2.6	27
E	1.5	2.1	3	E	1.7	2.4	17	E	1.7	2.4	15
ESE	1.3	1.8	0	ESE	1.7	2.4	8	ESE	1.7	2.3	7
SE	0.7	1.3	0	SE	1.6	2.3	2	SE	1.6	2.2	2
SSE	0.8	1.4	0	SSE	1.1	2.0	1	SSE	1.1	1.9	0
S	0.8	1.5	0	S	1.3	2.1	4	S	1.4	2.1	4
SSW	1.7	2.2	4	SSW	1.7	2.2	12	SSW	1.5	2.1	5
SW	2.0	2.5	18	SW	1.5	2.0	13	SW	1.5	2.2	17
WSW	1.5	2.1	6	WSW	1.3	2.0	11	WSW	1.3	2.0	8
W	1.7	2.3	31	W	1.1	1.8	10	W	1.2	1.8	11
WNW	1.5	2.0	12	WNW	0.8	1.3	0	WNW	0.9	1.3	0
NW	1.2	1.8	2	NW	0.6	1.0	0	NW	0.6	0.9	0
NNW	1.5	2.0	1	NNW	0.7	1.0	0	NNW	0.4	0.9	0
N	1.3	1.9	1	N	0.7	1.1	0	N	0.6	1.1	0

TABLE C-44
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS			PROPOSED RUGGLES CENTER			PROPOSED RUGGLES CENTER WITH REMEDIAL DEIVCES		
LOCATION 13			**LOCATION 13**			**LOCATION 13**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.4	1.9	2	NNE	0.8	1.4	0	NNE	0.7	1.2	0
NE	1.5	2.0	10	NE	0.6	1.2	0	NE	0.9	1.6	5
ENE	1.6	2.1	6	ENE	1.9	2.6	18	ENE	1.5	2.0	8
E	1.6	2.2	5	E	1.2	2.1	5	E	1.1	1.8	2
ESE	1.3	1.8	0	ESE	1.0	1.9	1	ESE	1.1	1.7	1
SE	1.3	1.9	0	SE	0.7	1.4	0	SE	1.0	1.6	0
SSE	1.0	1.6	0	SSE	0.8	1.7	0	SSE	1.1	1.8	0
S	0.5	1.2	0	S	2.0	2.9	16	S	1.7	2.5	14
SSW	1.4	2.1	2	SSW	2.4	2.9	35	SSW	1.9	2.5	24
SW	1.9	2.4	15	SW	1.8	2.4	19	SW	1.7	2.3	27
WSW	1.6	2.2	9	WSW	1.0	1.8	1	WSW	1.1	1.8	4
W	1.7	2.3	29	W	1.1	1.7	3	W	1.2	1.8	13
WNW	1.5	2.1	16	WNW	0.9	1.5	1	WNW	1.0	1.5	2
NW	1.3	1.8	4	NW	0.6	1.0	0	NW	0.6	1.0	0
NNW	1.4	2.1	2	NNW	0.8	1.0	0	NNW	0.5	0.9	0
N	1.2	1.8	1	N	0.4	0.9	0	N	0.4	0.9	0
LOCATION 14			**LOCATION 14**			**LOCATION 14**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.4	1.9	2	NNE	2.0	2.8	21	NNE	2.0	2.7	23
NE	1.4	2.0	8	NE	0.9	1.6	1	NE	1.1	1.8	5
ENE	1.5	2.1	5	ENE	1.0	1.5	0	ENE	1.6	2.3	12
E	1.5	2.0	3	E	0.9	1.6	0	E	1.2	2.0	4
ESE	1.3	1.8	0	ESE	0.8	1.6	0	ESE	1.1	1.7	0
SE	1.5	2.0	0	SE	1.1	1.8	0	SE	1.2	1.7	0
SSE	0.8	1.3	0	SSE	1.8	2.6	2	SSE	1.5	2.3	1
S	0.6	1.2	0	S	2.3	3.0	15	S	1.9	2.5	8
SSW	1.3	2.0	1	SSW	2.3	2.8	21	SSW	1.8	2.3	9
SW	1.7	2.2	8	SW	1.5	2.1	5	SW	1.4	2.0	5
WSW	1.6	2.2	7	WSW	0.7	1.4	0	WSW	0.8	1.4	0
W	1.7	2.3	32	W	1.0	1.5	0	W	0.9	1.5	1
WNW	1.6	2.2	27	WNW	1.0	1.8	3	WNW	0.8	1.3	0
NW	1.3	1.8	4	NW	0.9	1.5	0	NW	0.7	1.1	0
NNW	1.1	1.8	0	NNW	2.1	2.7	20	NNW	1.9	2.5	18
N	1.3	1.8	1	N	1.9	2.5	11	N	1.8	2.4	14
LOCATION 15			**LOCATION 15**			**LOCATION 15**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.6	2.2	4	NNE	1.6	2.4	5	NNE	1.3	2.0	1
NE	1.3	1.8	4	NE	1.1	1.7	2	NE	1.2	1.9	3
ENE	1.0	1.5	0	ENE	1.2	1.8	1	ENE	1.2	1.9	1
E	1.0	1.7	1	E	1.5	2.2	3	E	1.4	2.1	2
ESE	0.6	1.0	0	ESE	1.4	2.0	0	ESE	1.3	1.9	0
SE	0.5	0.8	0	SE	1.4	1.9	0	SE	1.3	1.8	0
SSE	0.9	1.2	0	SSE	0.9	1.5	0	SSE	1.0	1.5	0
S	0.8	1.3	0	S	1.3	1.9	0	S	1.3	1.9	0
SSW	1.1	1.9	1	SSW	1.5	2.0	0	SSW	1.5	2.0	0
SW	1.6	2.3	11	SW	2.0	2.6	12	SW	1.9	2.4	8
WSW	1.9	2.6	26	WSW	1.7	2.4	6	WSW	1.7	2.4	7
W	1.8	2.5	40	W	1.7	2.4	22	W	1.7	2.5	26
WNW	1.2	2.0	9	WNW	1.7	2.6	41	WNW	1.7	2.6	48
NW	0.8	1.6	1	NW	1.5	2.1	7	NW	1.4	2.0	3
NNW	1.1	1.8	0	NNW	0.8	1.3	0	NNW	0.6	1.1	0
N	1.5	2.0	3	N	1.4	2.1	1	N	1.2	2.0	1

TABLE C-45
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS				PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEIVCES			
LOCATION 16				LOCATION 16				LOCATION 16			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.0	1.5	0	NNE	1.5	2.1	2	NNE	1.1	1.8	0
NE	1.2	1.7	2	NE	1.1	1.7	1	NE	1.2	1.8	2
ENE	1.2	1.7	1	ENE	1.4	1.9	1	ENE	1.4	1.9	1
E	1.4	2.0	1	E	1.2	1.8	0	E	1.1	1.7	0
ESE	1.3	1.8	0	ESE	0.9	1.3	0	ESE	0.9	1.3	0
SE	1.1	1.7	0	SE	1.0	1.5	0	SE	1.0	1.5	0
SSE	1.2	1.8	0	SSE	0.8	1.4	0	SSE	0.7	1.4	0
S	0.9	1.6	0	S	1.2	1.9	0	S	1.1	1.8	0
SSW	0.7	1.4	0	SSW	1.5	2.2	1	SSW	1.4	2.0	0
SW	1.5	2.2	4	SW	1.8	2.4	5	SW	1.6	2.3	4
WSW	1.7	2.3	5	WSW	1.9	2.7	13	WSW	1.9	2.6	14
W	2.1	2.7	47	W	1.8	2.7	35	W	1.8	2.7	37
WNW	2.0	2.5	36	WNW	1.8	2.7	42	WNW	1.7	2.6	41
NW	1.5	2.0	3	NW	1.0	1.7	0	NW	0.8	1.6	0
NNW	1.5	2.2	1	NNW	1.2	1.8	0	NNW	0.9	1.5	0
N	1.1	1.6	0	N	1.2	1.9	1	N	1.2	2.0	1
LOCATION 17				LOCATION 17				LOCATION 17			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.2	2.0	2	NNE	1.1	1.8	1	NNE	1.1	1.8	2
NE	1.6	2.3	18	NE	1.5	2.2	13	NE	1.2	1.9	8
ENE	1.3	2.0	3	ENE	1.4	2.0	4	ENE	1.4	1.9	4
E	1.5	2.1	3	E	1.5	2.0	3	E	1.4	1.9	2
ESE	1.5	2.0	1	ESE	1.2	1.8	0	ESE	1.2	1.7	0
SE	1.9	2.5	2	SE	1.7	2.3	1	SE	1.5	2.1	1
SSE	1.4	2.1	0	SSE	1.1	1.8	0	SSE	1.0	1.7	0
S	1.6	2.2	2	S	1.1	1.8	0	S	1.0	1.6	0
SSW	0.9	1.4	0	SSW	1.2	1.9	1	SSW	1.3	1.9	1
SW	1.3	1.9	2	SW	1.4	2.0	4	SW	1.3	2.0	4
WSW	1.5	2.2	5	WSW	1.5	2.2	6	WSW	1.4	2.1	6
W	1.6	2.3	29	W	1.7	2.3	29	W	1.7	2.3	36
WNW	1.6	2.1	17	WNW	1.6	2.3	35	WNW	1.5	2.2	33
NW	1.6	2.1	14	NW	0.5	1.2	0	NW	0.5	1.1	0
NNW	1.6	2.1	2	NNW	1.4	1.9	1	NNW	1.3	1.9	1
N	1.4	1.9	2	N	1.4	2.1	4	N	1.2	1.9	2
LOCATION 18				LOCATION 18				LOCATION 18			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.4	1.9	2	NNE	1.6	2.5	14	NNE	1.3	2.2	7
NE	1.2	1.7	4	NE	1.4	2.0	12	NE	1.4	2.0	12
ENE	1.4	1.9	3	ENE	1.5	2.1	7	ENE	1.5	2.1	8
E	1.3	1.9	2	E	1.4	1.9	3	E	1.4	2.0	3
ESE	1.0	1.5	0	ESE	1.1	1.7	0	ESE	1.1	1.6	0
SE	1.3	1.9	0	SE	1.0	1.6	0	SE	1.2	1.6	0
SSE	0.8	1.4	0	SSE	0.6	1.3	0	SSE	0.9	1.3	0
S	0.7	1.4	0	S	1.2	1.9	1	S	1.2	1.8	1
SSW	0.8	1.5	0	SSW	1.3	2.0	2	SSW	1.3	1.9	2
SW	1.3	1.9	2	SW	1.5	2.1	6	SW	1.5	2.1	8
WSW	1.5	2.1	6	WSW	1.1	1.8	1	WSW	1.2	1.9	2
W	1.8	2.4	48	W	1.3	2.2	27	W	1.4	2.4	45
WNW	1.6	2.1	24	WNW	1.0	1.8	7	WNW	1.1	1.8	6
NW	1.4	1.9	6	NW	0.9	1.7	2	NW	0.6	1.1	0
NNW	1.2	1.8	0	NNW	1.9	2.5	16	NNW	1.4	2.1	3
N	1.4	1.8	1	N	1.0	1.7	1	N	1.1	1.9	2

TABLE C-46
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS			PROPOSED RUGGLES CENTER			PROPOSED RUGGLES CENTER WITH REMEDIAL DEIVCES		
LOCATION 19			LOCATION 19			LOCATION 19		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.4	1.9	2	2.3	3.1	26	2.0	2.6	25
NE	1.5	2.0	9	1.2	1.9	4	0.7	1.3	0
ENE	1.7	2.2	7	1.6	2.3	5	1.7	2.2	11
E	1.5	2.1	3	1.2	1.9	1	1.5	2.0	6
ESE	1.4	2.0	1	1.6	2.1	1	1.8	2.3	6
SE	1.6	2.1	1	1.9	2.4	1	1.9	2.4	3
SSE	0.9	1.4	0	2.1	3.0	3	2.0	2.8	5
S	0.4	1.1	0	2.0	3.2	17	1.9	2.9	25
SSW	1.4	2.0	2	0.7	1.1	0	0.4	1.1	0
SW	1.9	2.4	13	0.7	1.2	0	0.4	0.4	0
WSW	1.7	2.3	9	0.8	1.3	0	0.7	1.1	0
W	1.7	2.3	30	1.0	1.6	0	0.6	1.0	0
WNW	1.5	2.1	18	1.4	2.3	19	0.5	0.8	0
NW	1.3	1.9	4	1.1	1.8	1	0.7	1.2	0
NNW	1.2	1.8	0	2.0	2.6	10	1.7	2.2	9
N	1.3	1.8	1	2.0	2.6	11	1.7	2.2	12
LOCATION 20			LOCATION 20			LOCATION 20		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.4	2.1	2	2.4	3.1	14	2.1	2.7	33
NE	1.6	2.1	9	1.2	1.8	1	0.7	1.4	2
ENE	1.7	2.3	8	2.2	2.8	9	1.3	1.9	6
E	1.3	1.9	1	2.0	2.8	6	1.6	2.2	12
ESE	1.4	2.0	1	2.2	2.7	2	2.0	2.5	12
SE	1.5	2.0	0	1.9	2.4	0	1.9	2.4	3
SSE	0.8	1.4	0	1.6	2.3	0	1.5	2.1	1
S	0.7	1.4	0	1.5	2.3	1	1.4	2.1	5
SSW	1.6	2.2	2	1.1	1.6	0	0.6	1.1	0
SW	1.9	2.4	13	0.9	1.5	0	0.7	1.0	0
WSW	1.7	2.3	7	0.8	1.4	0	0.4	0.8	0
W	1.8	2.5	36	1.2	2.0	2	0.5	0.8	0
WNW	1.6	2.1	16	1.8	2.8	41	0.4	0.8	0
NW	1.3	1.8	2	1.6	2.3	5	1.1	1.5	2
NNW	1.3	2.0	1	2.5	3.1	16	1.8	2.3	18
N	1.3	1.9	1	1.9	2.4	2	1.5	2.0	6
LOCATION 21			LOCATION 21			LOCATION 21		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.2	1.8	1	0.8	1.6	0	1.0	1.5	12
NE	1.7	2.1	12	0.9	1.5	0	0.4	1.0	3
ENE	1.8	2.3	9	2.3	3.0	22	0.7	1.2	3
E	1.4	1.9	2	2.3	3.2	25	1.3	1.8	26
ESE	1.5	2.1	1	2.6	3.2	13	1.5	2.0	20
SE	1.6	2.1	1	2.0	2.5	1	1.4	1.8	6
SSE	0.9	1.4	0	1.5	2.1	0	0.9	1.3	0
S	1.0	1.7	0	1.2	2.0	0	1.1	1.7	10
SSW	1.7	2.2	3	1.4	2.1	1	0.6	1.0	0
SW	1.9	2.4	12	0.8	1.3	0	0.1	0.7	0
WSW	1.8	2.4	11	0.7	1.2	0	0.4	0.7	0
W	1.7	2.4	31	0.9	1.4	0	0.6	1.0	1
WNW	1.5	2.1	15	1.1	1.9	2	0.4	0.7	0
NW	1.2	1.8	2	1.5	2.4	16	0.6	1.1	3
NNW	1.2	1.9	0	2.0	2.8	17	0.9	1.4	5
N	1.0	1.6	0	1.2	1.7	0	0.7	1.4	7

TABLE C-47
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS			PROPOSED RUGGLES CENTER			PROPOSED RUGGLES CENTER WITH REMEDIAL DEIVCES		
LOCATION 22			**LOCATION 22**			**LOCATION 22**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.4	1.9	1	1.8	2.4	7	0.3	0.7	0
NE	1.6	2.1	10	1.0	1.6	1	0.4	0.9	1
ENE	1.7	2.3	8	0.9	1.7	1	0.5	0.9	0
E	1.3	1.9	1	1.0	1.7	0	0.5	0.9	0
ESE	1.5	2.0	1	1.6	2.4	3	0.6	1.0	1
SE	1.3	1.8	0	2.1	2.8	3	0.3	0.6	0
SSE	0.9	1.6	0	2.1	2.8	2	0.6	0.8	0
S	0.9	1.6	0	2.0	2.7	7	0.1	1.0	1
SSW	1.8	2.2	3	1.4	2.3	3	0.5	0.9	0
SW	2.0	2.5	16	0.9	1.5	0	0.6	0.8	0
WSW	1.8	2.4	13	1.4	2.0	2	0.7	1.1	3
W	1.8	2.4	31	1.5	2.0	6	0.8	1.1	9
WNW	1.5	2.1	15	1.9	2.5	45	0.8	1.1	14
NW	0.9	1.5	0	1.5	2.1	6	0.9	1.3	36
NNW	0.8	1.4	0	1.7	2.4	4	0.8	1.3	6
N	1.1	1.7	0	1.9	2.6	11	0.8	1.6	26
LOCATION 23			**LOCATION 23**			**LOCATION 23**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.5	2.0	2	0.9	1.4	0	0.8	1.2	0
NE	1.6	2.1	11	1.1	1.7	1	0.7	1.3	1
ENE	1.7	2.3	9	0.9	1.6	0	0.6	1.0	0
E	1.2	1.8	1	1.7	2.4	3	0.8	1.2	0
ESE	1.6	2.1	1	2.3	3.1	7	0.7	1.1	0
SE	1.4	2.0	0	2.4	3.2	3	0.3	0.8	0
SSE	1.0	1.7	0	2.4	3.1	2	0.6	0.9	0
S	0.8	1.4	0	2.3	2.9	6	0.1	0.8	0
SSW	1.7	2.2	3	1.3	2.3	1	0.6	1.0	0
SW	1.9	2.4	14	0.9	1.5	0	0.7	1.1	0
WSW	1.8	2.3	11	1.7	2.3	2	1.3	2.0	17
W	1.8	2.4	32	1.9	2.5	16	1.5	2.3	74
WNW	1.5	2.0	14	2.1	2.7	37	1.0	1.6	9
NW	0.9	1.5	0	1.7	2.3	5	0.4	0.8	0
NNW	1.0	1.6	0	2.2	2.8	9	0.5	1.0	0
N	1.2	1.8	1	2.1	2.8	9	0.7	1.2	0
LOCATION 24			**LOCATION 24**			**LOCATION 24**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.3	1.8	1	1.0	1.5	0	0.2	0.5	0
NE	1.5	2.0	7	1.2	1.9	1	0.4	0.9	0
ENE	1.6	2.2	6	0.8	1.4	0	0.5	1.0	0
E	1.3	1.9	1	1.9	2.6	3	1.0	1.6	9
ESE	1.4	2.0	1	2.3	3.0	3	1.4	2.1	18
SE	1.4	2.0	0	2.4	3.0	1	1.6	2.3	11
SSE	1.0	1.6	0	2.2	2.9	1	1.3	1.8	3
S	0.8	1.4	0	2.2	2.8	2	1.3	1.8	9
SSW	1.6	2.2	3	1.9	2.6	1	1.6	2.0	32
SW	1.9	2.4	15	0.8	1.4	0	0.6	1.1	1
WSW	1.8	2.4	12	1.6	2.4	1	0.5	1.2	1
W	1.8	2.4	33	2.1	2.8	17	0.8	1.4	13
WNW	1.6	2.1	19	2.3	3.2	57	0.6	1.1	1
NW	1.1	1.7	1	1.7	2.3	3	0.1	1.0	0
NNW	1.1	1.7	0	2.3	3.0	7	0.1	0.2	0
N	1.2	1.7	1	1.8	2.6	3	0.6	1.0	0

TABLE C-48
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS			PROPOSED RUGGLES CENTER			PROPOSED RUGGLES CENTER WITH REMEDIAL DEIVCES		
LOCATION 25			**LOCATION 25**			**LOCATION 25**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.4	1.9	2	1.0	1.8	0	0.5	1.1	0
NE	1.4	1.9	7	1.2	2.1	3	0.7	1.4	1
ENE	1.5	2.1	5	1.8	2.3	3	0.4	1.1	0
E	1.5	2.0	3	1.5	2.2	1	0.9	1.6	0
ESE	1.5	2.0	1	1.7	2.3	1	1.2	1.9	1
SE	1.6	2.1	1	1.8	2.4	0	1.4	2.1	1
SSE	1.0	1.8	0	1.7	2.5	0	1.4	2.1	0
S	0.8	1.4	0	1.6	2.4	1	0.7	1.3	0
SSW	1.2	1.9	1	1.8	2.5	2	0.6	1.3	0
SW	1.7	2.2	9	1.5	2.2	1	0.5	1.0	0
WSW	1.7	2.2	9	1.5	2.4	2	1.4	2.2	11
W	1.7	2.3	35	1.7	2.5	15	1.6	2.5	55
WNW	1.6	2.1	21	2.2	3.0	58	1.3	2.2	31
NW	1.1	1.7	2	1.6	2.1	3	0.7	1.2	0
NNW	1.2	1.8	0	2.2	2.9	9	0.8	1.3	0
N	1.3	1.9	2	1.5	2.2	1	0.8	1.5	0
LOCATION 26			**LOCATION 26**			**LOCATION 26**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.5	2.0	3	1.7	2.2	4	1.5	2.0	15
NE	1.6	2.1	11	0.6	1.2	0	0.5	1.1	0
ENE	1.5	2.1	6	1.2	1.9	2	1.2	1.8	8
E	1.3	2.0	3	1.7	2.4	7	1.4	1.9	9
ESE	1.5	2.0	1	1.4	2.2	2	0.9	1.5	1
SE	1.2	1.8	0	1.2	1.9	0	0.4	0.7	0
SSE	1.1	1.8	0	1.7	2.4	1	0.6	1.0	0
S	1.0	1.7	0	2.1	2.7	8	0.8	1.2	0
SSW	1.8	2.3	7	2.6	3.2	39	1.0	1.4	0
SW	2.0	2.4	18	1.3	2.2	5	0.5	0.8	0
WSW	2.0	2.6	25	0.8	1.5	0	0.6	1.2	0
W	1.5	2.2	23	0.8	1.5	0	0.6	1.2	1
WNW	0.9	1.5	0	0.8	1.5	0	0.7	1.3	1
NW	1.0	1.7	1	1.0	1.8	2	1.1	1.8	23
NNW	1.1	1.7	0	1.1	2.0	1	0.9	1.6	2
N	1.3	1.9	1	2.3	3.0	28	1.9	2.4	39
LOCATION 27			**LOCATION 27**			**LOCATION 27**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.5	2.1	4	0.9	1.2	0	0.1	0.7	0
NE	1.5	2.0	9	0.7	1.2	0	0.5	0.9	0
ENE	1.6	2.1	6	0.7	1.3	0	0.1	1.3	2
E	1.2	1.7	1	1.3	1.9	1	0.6	1.0	0
ESE	1.6	2.1	1	1.2	1.9	0	0.6	1.0	0
SE	1.2	1.8	0	1.2	1.8	0	0.4	0.9	0
SSE	1.2	1.9	0	1.6	2.2	0	0.6	1.0	0
S	0.9	1.5	0	2.0	2.7	6	0.7	1.1	0
SSW	1.7	2.2	3	2.8	3.4	45	0.6	1.1	0
SW	2.0	2.5	20	1.6	2.7	19	0.7	1.1	0
WSW	1.9	2.4	16	1.3	1.9	1	1.1	1.6	8
W	1.7	2.3	31	1.3	1.8	1	1.2	1.9	59
WNW	1.2	1.8	4	1.3	1.8	1	1.0	1.5	14
NW	1.1	1.8	3	1.8	2.4	20	1.1	1.6	16
NNW	1.2	1.8	0	1.6	2.3	3	1.0	1.4	1
N	1.3	1.9	1	1.1	1.8	0	0.8	1.3	1

TABLE C-49
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS			PROPOSED RUGGLES CENTER			PROPOSED RUGGLES CENTER WITH REMEDIAL DEIVCES		
LOCATION 28			**LOCATION 28**			**LOCATION 28**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.5	2.0	2	NNE	1.0	1.4	0	NNE	0.3	0.7	0
NE	1.5	2.1	10	NE	0.7	1.1	0	NE	0.5	0.8	0
ENE	1.6	2.2	7	ENE	0.7	1.3	0	ENE	0.1	0.9	0
E	1.2	1.8	1	E	1.1	1.7	0	E	0.7	1.2	0
ESE	1.6	2.1	1	ESE	1.0	1.8	0	ESE	0.7	1.3	0
SE	1.3	1.8	0	SE	1.4	2.2	0	SE	0.6	1.2	0
SSE	1.3	2.0	0	SSE	2.0	2.8	1	SSE	1.2	1.8	1
S	1.0	1.6	0	S	1.8	2.3	1	S	1.1	1.6	1
SSW	1.6	2.2	3	SSW	2.4	3.0	16	SSW	1.6	2.2	28
SW	1.9	2.4	14	SW	1.7	2.7	16	SW	0.8	1.2	0
WSW	1.8	2.3	11	WSW	1.9	2.6	11	WSW	0.8	1.5	3
W	1.8	2.4	33	W	2.0	2.6	26	W	1.2	1.9	56
WNW	1.4	2.0	11	WNW	1.9	2.4	23	WNW	0.9	1.5	10
NW	1.2	1.9	4	NW	1.7	2.1	5	NW	0.7	1.1	0
NNW	1.3	1.9	0	NNW	1.5	2.1	0	NNW	0.6	1.0	0
N	1.5	2.0	2	N	1.1	1.7	0	N	0.3	1.1	0
LOCATION 29			**LOCATION 29**			**LOCATION 29**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.5	2.0	2	NNE	0.8	1.2	0	NNE	0.4	0.9	0
NE	1.4	2.0	7	NE	0.9	1.4	0	NE	0.5	0.9	0
ENE	1.6	2.2	7	ENE	0.1	1.1	0	ENE	0.7	1.1	0
E	1.4	2.0	2	E	1.1	1.8	0	E	1.3	2.1	18
ESE	1.6	2.2	2	ESE	1.5	2.4	1	ESE	2.0	2.8	36
SE	1.3	1.9	0	SE	2.6	3.6	5	SE	2.3	3.1	22
SSE	1.4	2.1	0	SSE	2.4	3.3	2	SSE	2.1	3.0	17
S	1.0	1.6	0	S	1.1	1.8	0	S	1.1	1.8	6
SSW	1.4	2.0	1	SSW	1.0	1.8	0	SSW	0.7	1.3	0
SW	1.8	2.3	12	SW	1.3	2.1	0	SW	0.6	1.1	0
WSW	1.7	2.3	11	WSW	2.2	2.9	15	WSW	0.7	1.0	0
W	1.8	2.4	31	W	2.3	2.9	38	W	0.8	1.3	1
WNW	1.5	2.1	17	WNW	2.2	2.8	35	WNW	0.7	1.1	0
NW	1.3	1.9	5	NW	1.8	2.2	4	NW	0.3	0.7	0
NNW	1.2	1.9	0	NNW	1.4	1.8	0	NNW	0.4	0.8	0
N	1.5	2.1	3	N	0.9	1.5	0	N	0.1	0.8	0
LOCATION 30			**LOCATION 30**			**LOCATION 30**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.4	1.9	2	NNE	0.9	1.5	0	NNE	0.7	1.1	0
NE	1.3	1.9	6	NE	1.0	1.6	0	NE	0.6	1.1	1
ENE	1.5	2.1	6	ENE	1.9	2.5	5	ENE	1.8	2.3	29
E	1.5	2.0	3	E	1.7	2.4	3	E	1.5	2.2	20
ESE	1.5	2.1	2	ESE	2.3	2.9	4	ESE	2.1	2.7	27
SE	1.3	1.8	0	SE	2.4	3.0	2	SE	2.0	2.7	10
SSE	1.4	2.0	0	SSE	2.0	2.8	1	SSE	1.5	2.3	4
S	1.0	1.6	0	S	0.9	1.8	0	S	0.9	1.5	1
SSW	1.2	1.8	1	SSW	1.2	1.8	0	SSW	1.0	1.5	1
SW	1.7	2.2	10	SW	1.1	1.7	0	SW	0.8	1.3	0
WSW	1.7	2.3	11	WSW	2.1	2.7	11	WSW	0.9	1.5	2
W	1.7	2.3	32	W	2.2	2.8	35	W	0.8	1.5	5
WNW	1.5	2.1	18	WNW	2.1	2.7	35	WNW	0.3	1.0	0
NW	1.2	1.9	5	NW	1.6	2.1	3	NW	0.1	0.7	0
NNW	1.2	1.8	0	NNW	1.2	1.7	0	NNW	0.5	0.8	0
N	1.5	2.0	3	N	1.0	1.7	0	N	0.1	0.7	0

TABLE C-50
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS			PROPOSED RUGGLES CENTER			PROPOSED RUGGLES CENTER WITH REMEDIAL DEIVCES		
LOCATION 31			LOCATION 31			LOCATION 31		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.4	2.0	3	0.7	1.2	0	0.5	0.9	0
NE	1.3	1.8	4	0.6	1.2	0	0.6	1.3	1
ENE	1.6	2.2	6	1.9	2.5	25	1.9	2.5	34
E	1.5	2.0	3	1.3	2.2	10	1.3	2.2	14
ESE	1.7	2.3	3	1.4	2.3	7	1.5	2.4	13
SE	1.4	2.0	0	0.9	1.8	0	0.8	1.8	1
SSE	1.5	2.2	0	0.5	1.3	0	0.1	1.1	0
S	1.2	1.9	1	0.8	1.8	1	0.6	1.5	0
SSW	1.0	1.7	0	2.1	2.8	45	1.7	2.3	22
SW	1.6	2.2	7	1.4	2.0	12	1.4	2.0	15
WSW	1.7	2.3	11	0.7	1.1	0	0.5	1.1	0
W	1.7	2.3	27	0.7	0.9	0	0.4	0.9	0
WNW	1.3	1.9	9	0.7	1.1	0	0.6	1.1	0
NW	1.6	2.2	20	0.7	1.0	0	0.6	0.9	0
NNW	1.4	1.9	0	0.7	1.0	0	0.6	0.9	0
N	1.6	2.1	4	0.7	1.2	0	0.7	1.2	0
LOCATION 32			LOCATION 32			LOCATION 32		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.4	2.0	2	0.9	1.5	1	0.7	1.4	2
NE	1.2	1.7	2	1.0	1.7	11	0.9	1.6	15
ENE	1.7	2.3	8	1.5	2.1	15	1.2	1.8	13
E	1.3	1.9	2	0.7	1.4	1	0.7	1.4	1
ESE	1.8	2.4	3	1.0	1.7	1	1.1	1.8	4
SE	1.7	2.3	1	0.9	1.6	0	0.9	1.6	1
SSE	1.5	2.2	0	1.2	2.0	1	1.3	2.0	3
S	1.3	1.9	1	1.1	1.8	3	1.1	1.8	5
SSW	1.1	1.7	0	1.9	2.5	36	1.6	2.3	36
SW	1.6	2.2	7	1.5	2.2	30	1.2	1.8	20
WSW	1.7	2.2	6	0.8	1.2	0	0.5	1.0	0
W	1.6	2.2	19	0.9	1.2	0	0.6	1.0	0
WNW	1.1	1.7	2	0.9	1.2	0	0.6	1.0	0
NW	1.9	2.5	43	0.6	1.0	0	0.5	0.9	0
NNW	1.3	1.9	0	0.6	0.8	0	0.3	0.3	0
N	1.6	2.2	4	0.4	1.0	0	0.5	0.9	0
LOCATION 33			LOCATION 33			LOCATION 33		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.4	2.0	3	1.0	1.5	0	0.9	1.4	0
NE	1.1	1.6	2	1.5	2.5	35	1.4	2.4	37
ENE	1.7	2.3	10	1.9	2.8	30	1.9	2.8	38
E	1.2	1.8	1	0.5	1.2	0	0.7	1.4	0
ESE	1.8	2.4	4	0.7	1.4	0	0.9	1.6	0
SE	1.7	2.2	1	0.7	1.4	0	0.8	1.6	0
SSE	1.4	2.0	0	1.3	2.3	1	1.4	2.3	2
S	1.4	2.0	1	1.2	2.1	3	1.0	2.0	3
SSW	1.2	1.9	1	1.8	2.6	21	1.7	2.4	16
SW	1.6	2.1	6	1.5	2.1	10	1.2	1.8	3
WSW	1.7	2.2	8	0.7	1.2	0	0.6	1.2	0
W	1.4	2.1	17	0.8	1.2	0	0.6	1.1	0
WNW	1.4	2.1	17	0.8	1.3	0	0.7	1.2	0
NW	1.7	2.3	25	0.7	1.0	0	0.5	0.9	0
NNW	1.4	2.0	1	0.6	0.9	0	0.5	0.5	0
N	1.3	1.9	2	0.7	1.1	0	0.5	1.0	0

TABLE C-51
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS				PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEIVCES			
LOCATION 34				LOCATION 34				LOCATION 34			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.1	1.7	1	NNE	2.3	3.0	17	NNE	2.0	2.6	13
NE	0.9	1.4	1	NE	2.2	2.9	29	NE	2.0	2.7	29
ENE	1.6	2.2	10	ENE	2.0	2.8	13	ENE	1.9	2.7	17
E	0.9	1.5	0	E	1.1	1.9	1	E	1.0	1.8	1
ESE	1.6	2.2	3	ESE	1.3	2.2	1	ESE	1.2	2.1	1
SE	1.7	2.2	1	SE	2.0	2.8	2	SE	1.8	2.5	2
SSE	1.6	2.2	1	SSE	2.1	2.9	1	SSE	2.0	2.7	2
S	1.4	2.0	2	S	1.9	2.6	3	S	1.8	2.5	5
SSW	1.2	1.8	0	SSW	2.1	2.7	7	SSW	2.0	2.6	11
SW	1.5	2.0	6	SW	1.6	2.3	2	SW	1.4	2.0	2
WSW	1.7	2.2	12	WSW	0.8	1.3	0	WSW	0.6	1.2	0
W	1.3	1.9	8	W	1.2	1.7	0	W	1.0	1.6	0
WNW	1.6	2.2	40	WNW	1.4	2.0	2	WNW	1.2	1.6	1
NW	1.5	2.0	13	NW	0.8	1.3	0	NW	1.0	1.4	0
NNW	1.2	1.8	0	NNW	1.7	2.2	1	NNW	1.5	2.0	1
N	1.3	1.8	2	N	2.4	3.1	20	N	2.2	2.7	16
LOCATION 35				LOCATION 35				LOCATION 35			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.4	2.0	2	NNE	0.9	1.6	0	NNE	0.8	1.4	0
NE	1.1	1.6	1	NE	1.5	2.3	12	NE	1.5	2.2	13
ENE	1.4	1.8	1	ENE	1.6	2.3	5	ENE	1.7	2.4	8
E	1.5	2.0	2	E	1.3	1.9	1	E	1.4	1.9	1
ESE	1.5	2.0	1	ESE	1.3	1.8	0	ESE	1.4	1.9	0
SE	1.3	1.8	0	SE	1.0	1.6	0	SE	1.1	1.7	0
SSE	1.2	1.8	0	SSE	0.7	1.3	0	SSE	0.8	1.4	0
S	0.9	1.5	0	S	0.8	1.5	0	S	0.9	1.6	0
SSW	0.9	1.6	0	SSW	1.3	2.0	0	SSW	1.4	2.1	1
SW	1.3	2.0	2	SW	1.3	1.9	1	SW	1.4	2.0	2
WSW	1.7	2.3	7	WSW	1.9	2.7	18	WSW	1.5	2.2	4
W	1.9	2.5	37	W	1.9	2.8	49	W	1.8	2.6	43
WNW	1.6	2.2	22	WNW	1.2	2.2	11	WNW	1.5	2.3	25
NW	1.6	2.3	22	NW	1.2	1.9	2	NW	1.1	1.7	1
NNW	1.4	1.9	0	NNW	0.7	1.2	0	NNW	0.6	0.9	0
N	1.4	2.0	2	N	0.9	1.6	0	N	0.9	1.4	0
LOCATION 36				LOCATION 36				LOCATION 36			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	0.9	1.5	0	NNE	1.3	2.0	4	NNE	1.3	2.0	3
NE	1.2	1.7	2	NE	1.4	2.1	16	NE	1.3	2.0	10
ENE	1.3	1.7	1	ENE	1.2	1.7	2	ENE	1.2	1.7	2
E	1.6	2.1	2	E	1.4	1.9	2	E	1.4	1.9	3
ESE	1.5	2.1	1	ESE	1.3	1.8	1	ESE	1.2	1.8	0
SE	1.5	2.1	0	SE	1.1	1.8	0	SE	1.1	1.7	0
SSE	1.7	2.4	1	SSE	1.2	1.9	0	SSE	1.2	1.9	0
S	0.6	1.2	0	S	0.9	1.5	0	S	0.9	1.6	0
SSW	0.6	1.1	0	SSW	0.8	1.4	0	SSW	0.8	1.5	0
SW	0.8	1.3	0	SW	0.7	1.2	0	SW	0.6	1.2	0
WSW	1.5	2.0	2	WSW	1.6	2.3	14	WSW	1.3	1.9	2
W	1.8	2.5	33	W	1.7	2.4	53	W	1.7	2.5	57
WNW	1.9	2.5	39	WNW	1.1	1.8	8	WNW	1.3	2.1	22
NW	1.8	2.4	21	NW	0.9	1.4	0	NW	0.7	1.3	0
NNW	1.4	1.9	0	NNW	0.6	1.1	0	NNW	0.4	1.0	0
N	1.1	1.7	0	N	0.8	1.5	0	N	0.8	1.5	0

TABLE C-52
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS			PROPOSED RUGGLES CENTER			PROPOSED RUGGLES CENTER WITH REMEDIAL DEIVCES		
LOCATION 37			LOCATION 37			LOCATION 37		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.2	1.9	2	1.4	2.3	11	1.4	2.1	10
NE	1.1	1.5	1	2.0	2.8	56	1.9	2.6	50
ENE	1.4	1.9	2	1.6	2.3	13	1.5	2.2	13
E	1.6	2.2	5	1.2	1.8	3	1.1	1.7	2
ESE	1.9	2.4	4	1.0	1.5	0	1.0	1.6	0
SE	1.8	2.4	1	0.9	1.4	0	0.9	1.5	0
SSE	1.4	2.1	0	0.9	1.5	0	1.0	1.6	0
S	1.1	1.8	0	1.2	1.8	1	1.2	1.8	1
SSW	1.1	1.8	0	1.5	2.1	4	1.5	2.1	7
SW	1.4	2.1	3	1.3	1.9	3	1.4	2.0	10
WSW	1.7	2.2	6	1.1	1.7	1	1.0	1.6	1
W	1.7	2.3	26	0.8	1.2	0	0.7	1.3	0
WNW	1.3	1.9	5	1.1	1.7	4	0.8	1.4	0
NW	1.9	2.5	42	0.8	0.8	0	0.8	1.2	0
NNW	1.5	2.0	1	0.9	1.2	0	0.7	1.2	0
N	1.2	1.8	1	0.9	1.5	0	1.0	1.6	1
LOCATION 38			LOCATION 38			LOCATION 38		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	0 9	1.6	1	1.2	1.9	7	1.2	1.8	6
NE	1.1	1.7	6	1.0	1.6	8	0.9	1.6	7
ENE	1.4	2.0	7	1.2	1.8	8	1.2	1.8	7
E	1.5	2.1	6	1.1	1.7	4	1.0	1.7	3
ESE	1.7	2.5	8	1.5	2.1	6	1.5	2.1	6
SE	2.0	2.5	4	1.7	2.3	4	1.7	2.3	4
SSE	1.9	2.4	2	1.8	2.4	4	1.8	2.3	3
S	1.2	1.8	1	1.5	2.1	8	1.5	2.1	7
SSW	1.1	1.7	1	1.4	1.9	7	1.5	2.1	11
SW	1.4	2.0	8	1.2	1.7	5	1.2	1.9	10
WSW	1.5	2.0	6	0.8	1.3	0	0.7	1.2	0
W	1.3	1.9	14	1.1	1.8	19	0.9	1.7	11
WNW	1.5	2.0	28	0.8	1.3	1	0.6	1.2	0
NW	1.3	1.8	6	1.1	1.6	7	1.2	1.8	16
NNW	1.2	1.7	0	1.3	1.8	3	1.2	1.7	2
N	1.1	1.7	1	1.3	1.8	6	1.2	1.7	4
LOCATION 39			LOCATION 39			LOCATION 39		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	0.6	1.1	0	1.5	2.2	11	1.5	2.1	8
NE	0.6	1.1	0	1.6	2.4	36	1.5	2.2	25
ENE	1.4	2.1	12	0.6	1.4	1	0.8	1.4	1
E	0.9	1 6	2	0.8	1.3	0	0.7	1.3	0
ESE	1.3	2.1	5	1.3	1.9	2	1.3	1.9	2
SE	1.9	2.3	5	1.9	2.4	3	1.9	2.5	4
SSE	1.9	2.4	3	1.9	2.5	3	2.0	2.6	4
S	1.3	1.9	3	1.8	2.3	8	1.7	2.4	9
SSW	1.0	1.6	1	1.7	2.2	10	1.8	2.4	16
SW	1.3	1.8	4	1.4	2.0	7	1.4	1.9	7
WSW	1.3	1.8	5	0.9	1.5	0	0.9	1.4	0
W	1.3	1.8	18	1.2	1.7	7	1.1	1.7	7
WNW	1.4	1.9	31	0.9	1.4	0	0.7	1.3	0
NW	1.2	1.7	9	1.1	1.6	3	1.3	1.8	12
NNW	1.1	1.6	0	1.3	1.8	2	1.3	1.9	2
N	1.0	1.5	1	1.3	1.9	3	1.3	1.8	3

TABLE C-53
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS			PROPOSED RUGGLES CENTER			PROPOSED RUGGLES CENTER WITH REMEDIAL DEIVCES		
LOCATION 40			LOCATION 40			LOCATION 40		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	0.8	1.3	0	1.0	1.6	1	0.9	1.5	1
NE	0.7	1.2	1	1.3	2.2	18	1.1	1.9	15
ENE	0.7	1.2	0	1.5	2.5	18	1.4	2.1	13
E	0.7	1.3	0	1.0	1.8	2	0.9	1.7	2
ESE	0.9	1.6	1	1.7	2.3	5	1.6	2.3	6
SE	1.7	2.2	3	2.1	2.6	4	2.1	2.7	6
SSE	1.8	2.4	3	2.0	2.8	4	2.0	2.8	6
S	1.5	2.0	5	1.4	2.2	4	1.4	2.2	7
SSW	1.2	1.7	2	0.5	1.1	0	0.4	1.1	0
SW	1.3	1.7	5	0.8	1.3	0	0.8	1.3	0
WSW	1.2	1.8	6	1.0	1.4	0	0.9	1.3	0
W	1.2	1.8	19	0.9	1.3	0	0.8	1.6	3
WNW	1.4	1.9	36	1.4	2.1	30	0.9	1.5	3
NW	1.3	1.8	18	1.3	1.8	5	1.4	1.9	21
NNW	1.0	1.5	0	1.5	2.1	4	1.5	2.1	7
N	0.9	1.3	0	1.4	2.0	5	1.5	2.1	9
LOCATION 41			LOCATION 41			LOCATION 41		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.6	2.2	15	1.0	1.6	0	1.0	1.6	1
NE	1.1	1.7	9	0.8	1.8	3	0.8	1.6	4
ENE	0.7	1.1	0	1.9	2.7	14	1.7	2.4	23
E	1.1	1.7	2	1.1	1.9	1	1.0	1.8	3
ESE	0.7	1.3	0	1.7	2.3	1	1.6	2.2	5
SE	1.6	2.2	2	1.9	2.5	1	1.8	2.4	3
SSE	1.8	2.4	3	1.1	2.0	0	1.2	2.0	1
S	1.7	2.2	8	0.9	1.4	0	0.8	1.3	0
SSW	1.5	2.1	8	1.0	1.7	0	1.1	1.7	1
SW	1.4	1.8	6	0.9	1.5	0	1.1	1.7	2
WSW	1.0	1.7	3	1.7	2.3	6	0.8	1.5	0
W	1.0	1.6	6	1.9	2.4	26	1.4	2.0	31
WNW	1.1	1.7	10	1.8	2.6	44	1.1	1.6	4
NW	1.1	1.6	6	1.3	1.8	1	1.1	1.7	8
NNW	1.4	1.8	3	1.5	2.1	1	1.4	1.9	4
N	1.6	2.2	15	1.6	2.1	2	1.5	2.0	6
LOCATION 42			LOCATION 42			LOCATION 42		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.5	2.1	8	0.8	1.6	0	0.8	1.4	0
NE	1.1	1.6	3	1.5	2.4	8	1.7	2.5	42
ENE	0.9	1.4	0	1.8	2.7	7	2.0	2.8	35
E	1.4	2.0	5	1.4	2.2	1	1.4	2.1	8
ESE	1.0	1.7	0	2.1	2.7	2	1.9	2.4	8
SE	1.7	2.2	2	1.4	2.2	0	1.5	2.1	1
SSE	1.6	2.2	1	0.8	1.3	0	0.7	1.3	0
S	1.7	2.3	7	1.0	1.5	0	0.9	1.4	0
SSW	1.6	2.2	8	0.8	1.2	0	0.6	1.0	0
SW	1.6	2.1	12	0.6	1.1	0	0.6	0.9	0
WSW	1.2	2.0	6	1.1	1.7	0	0.4	0.6	0
W	1.0	1.7	4	1.9	2.5	12	0.5	1.0	0
WNW	1.3	1.8	13	2.5	3.0	57	1.0	1.5	2
NW	1.2	1.8	9	2.0	2.6	12	1.0	1.4	0
NNW	1.4	2.0	3	1.3	2.1	0	0.7	1.2	0
N	1.8	2.4	17	1.0	1.7	0	1.0	1.7	2

TABLE C-54
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS			PROPOSED RUGGLES CENTER			PROPOSED RUGGLES CENTER WITH REMEDIAL DEIVCES		
LOCATION 43			LOCATION 43			LOCATION 43		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.2	1.7	1	0.9	1.8	10	1.2	1.9	9
NE	1.1	1.6	4	0.1	1.3	2	1.1	1.9	22
ENE	1.0	1.6	1	0.6	1.6	5	1.5	2.3	29
E	1.3	1.9	4	0.1	0.9	0	0.7	1.6	3
ESE	1.3	2.0	2	1.5	2.3	14	1.5	2.1	7
SE	1.7	2.2	2	1.4	2.2	5	1.2	2.0	2
SSE	1.6	2.2	1	0.9	1.6	0	0.9	1.5	0
S	1.6	2.2	4	0.7	1.3	0	0.5	1.1	0
SSW	1.4	2.0	3	1.0	1.4	0	0.9	1.4	0
SW	1.6	2.1	12	0.6	0.9	0	0.3	0.8	0
WSW	1.5	2.1	10	0.5	0.9	0	0.5	0.6	0
W	1.0	1.8	6	1.0	1.4	4	0.8	1.3	1
WNW	1.4	2.0	26	1.1	1.5	10	0.9	1.3	1
NW	1.4	2.0	15	0.6	1.0	0	0.4	0.8	0
NNW	1.4	1.9	2	1.1	1.6	2	0.9	1.4	0
N	1.4	2.1	8	1.8	2.4	44	1.6	2.2	23
LOCATION 44			LOCATION 44			LOCATION 44		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.2	1.8	2	1.4	2.2	25	1.2	1.9	24
NE	1.0	1.5	2	0.8	1.6	10	0.8	1.6	23
ENE	1.2	1.7	2	0.2	1.0	0	0.1	1.3	2
E	1.0	1.7	1	0.6	1.3	1	0.1	1.0	0
ESE	1.4	2.1	3	1.3	2.1	9	0.7	1.4	1
SE	1.8	2.3	2	1.3	2.3	6	0.7	1.5	1
SSE	1.6	2.1	1	0.8	1.5	0	0.8	1.5	0
S	1.5	2.1	3	0.4	0.9	0	0.1	0.8	0
SSW	1.3	1.9	2	0.6	1.1	0	0.7	1.1	0
SW	1.6	2.1	10	0.5	1.0	0	0.2	0.7	0
WSW	1.6	2.1	11	0.5	0.9	0	0.5	0.5	0
W	1.0	1.6	2	0.8	1.1	0	0.5	1.0	0
WNW	1.5	2.2	40	0.8	1.1	0	0.5	1.0	0
NW	1.5	2.0	16	0.6	0.9	0	0.4	0.7	0
NNW	1.4	1.9	2	1.1	1.7	3	0.8	1.3	0
N	1.1	1.7	1	1.9	2.5	47	1.6	2.2	47
LOCATION 45			LOCATION 45			LOCATION 45		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.5	2.1	10	1.1	1.7	3	1.2	1.7	3
NE	1.4	2.0	19	0.7	1.3	2	0.8	1.4	2
ENE	1.0	1.6	2	1.5	2.5	33	1.4	2.3	21
E	0.9	1.6	2	1.2	2.0	8	1.3	1.9	6
ESE	0.8	1.4	0	1.6	2.2	8	1.5	2.2	5
SE	1.4	1.9	1	1.8	2.4	5	1.8	2.4	4
SSE	1.6	2.1	1	1.0	1.7	0	0.8	1.6	0
S	1.6	2.2	6	0.9	1.6	1	0.8	1.4	0
SSW	1.7	2.2	12	0.9	1.5	0	0.9	1.6	0
SW	1.6	2.0	15	0.8	1.1	0	0.6	1.1	0
WSW	1.0	1.6	1	1.2	1.8	6	1.5	2.1	17
W	1.1	1.6	5	0.9	1.4	2	1.3	1.9	22
WNW	1.0	1.5	3	1.0	1.4	2	1.0	1.5	4
NW	1.0	1.5	2	1.1	1.6	7	0.9	1.5	2
NNW	1.2	1.7	1	1.3	1.9	6	1.4	1.9	4
N	1.7	2.3	17	1.6	2.1	14	1.5	2.0	9

TABLE C-55
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS			PROPOSED RUGGLES CENTER			PROPOSED RUGGLES CENTER WITH REMEDIAL DEIVCES		
LOCATION 46			LOCATION 46			LOCATION 46		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	0.9	1.5	2	1.1	1.8	2	1.0	1.6	19
NE	1.3	1.8	21	1.2	1.9	8	1.0	1.5	27
ENE	1.3	1.9	14	1.4	2.3	11	0.6	1.3	6
E	1.0	1.6	3	1.7	2.4	13	0.9	1.6	16
ESE	0.9	1.4	0	1.8	2.5	7	0.8	1.4	3
SE	1.3	1.8	1	1.4	2.0	1	0.6	1.0	0
SSE	1.4	1.9	1	0.5	1.0	0	0.2	0.9	0
S	1.5	2.0	7	0.6	1.0	0	0.3	0.8	0
SSW	1.6	2.0	16	0.6	0.8	0	0.4	0.8	0
SW	1.3	2.0	25	0.5	0.9	0	0.5	0.5	0
WSW	0.6	1.3	0	0.9	1.4	0	0.1	0.7	0
W	1.0	1.4	5	1.4	2.0	19	0.3	0.8	0
WNW	0.7	1.2	0	1.3	2.0	18	0.2	0.6	0
NW	0.7	1.2	0	1.2	2.1	18	0.5	1.0	2
NNW	1.1	1.5	1	1.1	1.7	0	0.9	1.4	6
N	1.1	1.5	2	1.3	2.0	4	0.9	1.6	21
LOCATION 47			LOCATION 47			LOCATION 47		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.6	2.1	8	1.8	2.4	12	1.4	2.0	5
NE	1.5	2.0	15	1.5	2.3	21	1.4	2.0	16
ENE	1.2	1.7	2	1.7	2.7	25	1.4	2.3	14
E	1.4	2.1	7	1.3	2.2	6	1.2	2.0	5
ESE	1.0	1.6	0	1.8	2.5	7	1.5	2.2	4
SE	1.6	2.2	1	1.5	2.1	1	1.3	1.9	0
SSE	1.7	2.3	1	0.8	1.5	0	0.5	1.2	0
S	1.7	2.3	7	0.9	1.7	0	0.6	1.3	0
SSW	1.8	2.4	15	0.8	1.2	0	0.8	1.2	0
SW	1.6	2.2	17	0.7	1.0	0	0.6	0.9	0
WSW	1.0	1.6	1	1.2	1.7	1	1.5	1.9	6
W	1.1	1.6	2	1.1	1.8	5	1.6	2.1	34
WNW	1.1	1.7	4	1.2	1.8	8	1.3	1.8	14
NW	1.2	1.7	5	1.0	1.5	1	0.7	1.2	0
NNW	1.3	1.8	1	1.2	1.7	0	0.7	1.1	0
N	1.8	2.3	13	1.8	2.4	14	1.1	1.8	2
LOCATION 48			LOCATION 48			LOCATION 48		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.5	2.0	7	1.5	2.0	2	0.4	0.9	0
NE	1.5	2.0	17	1.8	2.5	23	0.4	1.2	2
ENE	1.1	1.6	2	1.9	2.8	23	0.5	1.3	1
E	1.5	2.1	7	2.1	2.9	21	0.6	1.2	0
ESE	1.0	1.6	0	2.5	3.2	17	0.8	1.3	0
SE	1.5	2.0	1	1.3	2.1	0	0.6	1.0	0
SSE	1.6	2.2	1	0.7	1.3	0	0.1	1.3	0
S	1.5	2.0	3	0.7	1.3	0	0.1	1.1	0
SSW	1.8	2.3	14	1.0	1.5	0	0.5	0.9	0
SW	1.6	2.2	21	0.6	0.8	0	0.4	0.4	0
WSW	0.9	1.7	2	1.2	1.6	0	1.0	1.5	5
W	0.9	1.5	1	1.2	1.7	2	1.1	1.7	27
WNW	1.1	1.6	4	1.4	1.9	6	1.2	1.8	50
NW	1.1	1.7	5	1.4	1.9	5	0.9	1.5	14
NNW	1.4	1.9	2	1.0	1.5	0	0.8	1.3	0
N	1.7	2.2	11	0.9	1.3	0	0.5	1.1	0

TABLE C-56
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS			PROPOSED RUGGLES CENTER			PROPOSED RUGGLES CENTER WITH REMEDIAL DEIVCES		
LOCATION 49			**LOCATION 49**			**LOCATION 49**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.6	2.1	7	NNE	1.5	2.0	4	NNE	0.6	1.0	0
NE	1.5	2.0	16	NE	1.7	2.4	26	NE	0.6	1.0	0
ENE	1.1	1.7	2	ENE	1.5	2.5	20	ENE	0.7	1.2	0
E	1.5	2.1	7	E	1.6	2.5	16	E	0.7	1.2	0
ESE	1.1	1.7	0	ESE	1.3	2.3	4	ESE	0.7	1.4	0
SE	1.5	2.0	1	SE	0.9	1.4	0	SE	0.5	1.1	0
SSE	1.6	2.2	1	SSE	0.8	1.3	0	SSE	0.5	1.1	0
S	1.5	2.1	3	S	0.8	1.4	0	S	1.0	1.5	1
SSW	1.9	2.3	13	SSW	0.7	1.3	0	SSW	0.6	1.1	0
SW	1.7	2.2	16	SW	0.5	0.9	0	SW	0.2	0.2	0
WSW	1.0	1.8	2	WSW	1.0	1.5	0	WSW	1.1	1.6	3
W	0.9	1.4	0	W	1.0	1.6	2	W	1.2	1.6	15
WNW	1.3	1.9	18	WNW	1.3	1.7	5	WNW	1.3	1.7	23
NW	1.1	1.6	2	NW	1.6	2.1	22	NW	1.5	2.0	52
NNW	1.0	1.5	0	NNW	1.1	1.6	0	NNW	1.0	1.5	1
N	1.7	2.2	10	N	1.2	1.6	1	N	1.0	1.6	3
LOCATION 50			**LOCATION 50**			**LOCATION 50**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.4	2.0	4	NNE	1.5	2.0	3	NNE	1.1	1.6	2
NE	1.4	1.9	11	NE	1.6	2.2	16	NE	1.0	1.5	5
ENE	1.1	1.6	1	ENE	1.8	2.6	21	ENE	1.0	1.7	6
E	1.4	2.0	4	E	1.9	2.8	23	E	1.3	2.0	10
ESE	1.2	1.7	1	ESE	1.5	2.1	2	ESE	1.2	1.9	4
SE	1.3	1.8	0	SE	0.8	1.3	0	SE	0.6	1.2	0
SSE	1.5	2.0	0	SSE	1.0	1.7	0	SSE	0.8	1.5	0
S	1.3	1.9	2	S	1.2	2.0	1	S	1.2	2.0	5
SSW	2.0	2.5	19	SSW	0.9	1.3	0	SSW	0.2	0.8	0
SW	2.0	2.5	38	SW	0.6	1.1	0	SW	0.1	0.6	0
WSW	1.2	2.0	5	WSW	1.1	1.7	1	WSW	1.0	1.6	2
W	0.9	1.3	0	W	1.1	1.8	6	W	1.0	1.6	10
WNW	1.1	1.6	3	WNW	1.1	1.6	2	WNW	1.1	1.7	16
NW	1.2	1.8	8	NW	1.5	2.2	24	NW	1.3	1.9	33
NNW	1.0	1.4	0	NNW	0.9	1.4	0	NNW	1.0	1.5	0
N	1.3	1.8	2	N	1.4	1.8	2	N	1.3	1.9	7
LOCATION 51			**LOCATION 51**			**LOCATION 51**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.7	2.2	9	NNE	1.8	2.5	3	NNE	1.2	1.6	1
NE	1.3	1.8	8	NE	1.6	2.8	17	NE	1.1	1.7	5
ENE	0.9	1.4	0	ENE	1.3	2.5	4	ENE	1.0	1.6	1
E	1.5	2.1	6	E	1.5	2.7	4	E	1.2	1.8	2
ESE	1.1	1.8	1	ESE	0.6	1.0	0	ESE	0.6	1.0	0
SE	1.6	2.1	1	SE	0.5	1.0	0	SE	0.5	0.8	0
SSE	1.6	2.2	1	SSE	0.5	0.9	0	SSE	0.3	0.6	0
S	1.6	2.2	4	S	0.8	1.3	0	S	0.6	0.9	0
SSW	1.7	2.3	10	SSW	0.6	0.8	0	SSW	0.1	0.6	0
SW	1.7	2.2	13	SW	0.6	1.1	0	SW	0.1	0.6	0
WSW	1.3	2.0	5	WSW	1.9	2.5	3	WSW	0.8	1.4	0
W	1.0	1.7	4	W	2.2	2.9	30	W	1.6	2.1	20
WNW	1.2	1.9	12	WNW	2.2	2.9	39	WNW	1.9	2.3	63
NW	1.2	1.8	6	NW	1.0	1.8	0	NW	1.4	1.9	8
NNW	1.4	2.0	4	NNW	1.1	1.8	0	NNW	0.4	0.8	0
N	1.9	2.4	16	N	1.3	1.8	0	N	1.2	1.6	1

TABLE C-57
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS			PROPOSED RUGGLES CENTER			PROPOSED RUGGLES CENTER WITH REMEDIAL DEIVCES		
LOCATION 52			**LOCATION 52**			**LOCATION 52**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.5	2.1	6	1.1	1.6	0	1.2	1.9	3
NE	1.3	1.8	7	1.0	1.5	1	0.9	1.5	2
ENE	1.1	1.6	1	1.1	1.6	0	1.3	1.8	2
E	1.4	2.0	5	0.9	1.5	0	1.3	1.8	2
ESE	1.2	1.8	1	0.8	1.3	0	0.8	1.2	0
SE	1.5	2.0	1	0.7	1.1	0	0.6	1.0	0
SSE	1.6	2.1	1	0.9	1.4	0	0.3	0.7	0
S	1.5	2.1	3	1.0	1.6	0	0.7	1.0	0
SSW	1.9	2.3	10	0.8	1.1	0	0.1	0.6	0
SW	1.8	2.3	21	0.5	0.9	0	0.1	1.2	0
WSW	1.5	2.2	12	1.7	2.3	8	1.4	2.0	6
W	0.7	1.2	0	1.7	2.4	26	1.4	2.2	30
WNW	1.4	2.0	17	1.7	2.4	30	1.4	2.0	24
NW	1.4	1.9	9	1.8	2.5	35	1.6	2.2	30
NNW	1.2	1.7	0	1.4	2.0	0	1.1	1.7	0
N	1.6	2.1	7	1.3	1.8	1	1.1	1.7	1
LOCATION 53			**LOCATION 53**			**LOCATION 53**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.4	2.0	1	1.0	1.5	0	0.1	0.2	0
NE	1.9	2.5	20	1.3	1.8	9	0.3	0.8	0
ENE	1.8	2.5	10	1.0	1.6	2	0.2	0.7	0
E	2.1	2.8	17	1.4	2.3	13	0.5	0.9	0
ESE	1.2	1.6	0	0.9	1.5	0	0.4	1.0	0
SE	1.0	1.3	0	1.0	1.6	0	0.6	1.2	0
SSE	0.9	1.4	0	1.1	1.6	0	1.0	1.7	3
S	1.1	1.7	0	1.1	1.6	0	1.0	1.6	7
SSW	2.0	2.4	5	1.6	2.1	8	0.9	1.6	11
SW	2.1	2.8	30	1.0	1.5	0	0.1	0.9	0
WSW	1.8	2.6	17	1.4	2.2	16	0.9	1.5	17
W	0.7	1.4	0	1.4	2.0	29	1.0	1.5	40
WNW	0.5	1.1	0	1.1	1.7	9	0.8	1.3	16
NW	0.7	1.0	0	1.1	1.8	9	0.7	1.2	7
NNW	0.8	1.3	0	1.0	1.6	0	0.5	0.9	0
N	1.1	1.7	0	1.1	1.8	3	0.5	0.7	0
LOCATION 54			**LOCATION 54**			**LOCATION 54**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.1	1.8	1	1.3	1.8	0	0.6	1.1	0
NE	1.8	2.3	18	0.8	1.4	0	0.6	1.1	0
ENE	1.8	2.4	12	2.2	2.9	8	0.9	1.4	0
E	1.7	2.2	6	2.2	3.0	8	1.4	1.9	1
ESE	1.7	2.2	2	2.4	3.1	4	0.1	0.8	0
SE	1.6	2.1	1	1.9	2.4	0	0.1	0.2	0
SSE	1.0	1.5	0	1.4	2.0	0	0.1	0.6	0
S	1.0	1.7	0	1.1	1.9	0	0.7	1.2	0
SSW	1.7	2.1	3	1.2	2.0	0	0.5	1.0	0
SW	1.7	2.2	9	1.0	1.6	0	0.1	0.2	0
WSW	1.7	2.3	10	1.4	2.1	0	0.1	0.6	0
W	1.6	2.1	18	2.0	2.6	12	1.1	1.8	3
WNW	1.5	2.0	14	2.4	3.1	57	1.6	2.4	42
NW	1.3	1.9	5	1.7	2.5	7	1.6	2.3	26
NNW	1.3	1.9	1	2.1	2.8	4	2.1	2.8	27
N	1.0	1.6	0	1.1	1.9	0	1.0	1.7	0

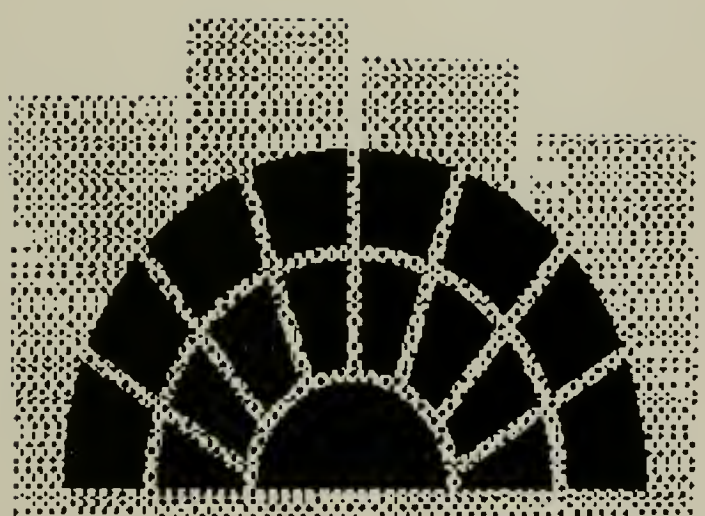
TABLE C-58
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS			PROPOSED RUGGLES CENTER			PROPOSED RUGGLES CENTER WITH REMEDIAL DEIVCES		
LOCATION 55			**LOCATION 55**			**LOCATION 55**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.0	1.5	0	1.6	2.1	3	0.5	0.9	0
NE	1.6	2.1	14	0.8	1.3	0	0.3	0.7	0
ENE	1.7	2.3	10	1.1	1.9	2	0.7	1.3	2
E	1.6	2.1	4	0.9	2.0	1	1.0	1.6	8
ESE	1.6	2.1	1	0.8	1.2	0	0.7	0.9	0
SE	1.4	2.0	0	0.7	1.0	0	0.3	0.7	0
SSE	1.1	1.6	0	0.6	1.0	0	0.5	0.8	0
S	1.3	1.8	1	1.0	1.5	0	0.3	0.8	0
SSW	1.6	2.0	2	1.1	2.0	1	1.4	2.2	54
SW	1.7	2.2	8	1.3	2.1	3	1.0	1.7	19
WSW	1.6	2.2	9	1.5	2.2	5	1.0	1.6	12
W	1.6	2.2	24	1.4	2.2	14	0.5	1.0	0
WNW	1.4	2.0	12	1.9	2.6	59	0.5	1.0	0
NW	1.2	1.8	3	1.3	2.2	11	0.6	1.1	1
NNW	1.7	2.3	8	1.2	2.0	0	0.8	1.4	2
N	1.2	1.8	1	1.0	1.7	0	0.6	1.2	0
LOCATION 56			**LOCATION 56**			**LOCATION 56**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.2	1.8	2	1.2	1.7	9	0.5	1.0	0
NE	1.5	2.1	13	0.7	1.0	1	0.3	0.7	0
ENE	1.9	2.4	15	0.9	1.5	4	0.1	0.7	0
E	1.5	2.0	4	0.5	0.8	0	0.4	0.7	0
ESE	1.3	1.8	1	0.7	1.0	0	0.6	0.9	0
SE	0.9	1.4	0	0.5	0.9	0	0.4	0.7	0
SSE	1.1	1.7	0	0.1	0.8	0	0.1	0.6	0
S	1.5	2.0	2	0.5	0.9	0	0.6	1.1	1
SSW	1.6	2.1	4	0.9	1.3	1	0.8	1.2	2
SW	1.7	2.2	10	1.2	1.7	16	0.8	1.3	9
WSW	1.4	2.0	5	0.8	1.3	1	0.3	1.0	0
W	1.4	2.0	15	0.8	1.4	9	0.6	1.1	5
WNW	1.6	2.0	19	1.1	1.6	28	0.8	1.3	25
NW	1.1	1.6	2	1.1	1.6	24	0.9	1.4	40
NNW	1.5	2.1	4	1.1	1.7	6	1.0	1.5	14
N	1.6	2.1	6	0.8	1.4	2	0.6	1.3	4
LOCATION 57			**LOCATION 57**			**LOCATION 57**		
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.2	1.8	1	1.3	1.9	1	0.6	0.9	0
NE	1.2	1.8	6	0.8	1.3	0	0.4	0.7	0
ENE	1.6	2.1	8	0.9	1.5	0	0.6	0.9	0
E	1.5	2.0	3	0.9	1.5	0	0.7	1.1	0
ESE	1.4	1.9	1	0.7	1.2	0	0.4	0.8	0
SE	1.0	1.5	0	1.0	1.5	0	0.3	0.6	0
SSE	1.2	1.8	0	0.8	1.2	0	0.4	0.8	0
S	1.6	2.2	4	1.0	1.5	0	0.9	1.4	0
SSW	1.7	2.2	5	1.6	2.3	3	1.3	1.9	2
SW	1.8	2.3	17	1.8	2.6	24	0.9	1.5	0
WSW	1.5	2.1	9	1.5	2.4	11	0.8	1.4	0
W	1.5	2.1	22	1.3	2.2	16	0.6	1.3	0
WNW	1.5	2.0	16	1.6	2.3	26	1.5	2.1	47
NW	0.9	1.5	1	1.4	2.2	18	1.5	2.1	35
NNW	1.4	1.9	1	1.3	1.9	0	1.5	2.2	10
N	1.5	2.1	6	1.0	1.6	0	1.4	2.0	6

TABLE C-59
PEDESTRIAN LEVEL WIND TEST DATA

EXISTING SITE CONDITIONS				PROPOSED RUGGLES CENTER				PROPOSED RUGGLES CENTER WITH REMEDIAL DEIVCES			
LOCATION 58				LOCATION 58				LOCATION 58			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.2	1.8	5	NNE	1.0	1.6	0	NNE	0.6	1.0	0
NE	0.9	1.4	3	NE	0.9	1.4	1	NE	0.6	0.9	0
ENE	1.3	1.9	9	ENE	1.2	1.9	3	ENE	0.2	0.7	0
E	1.6	2.2	14	E	1.2	2.0	3	E	0.5	1.0	0
ESE	1.4	1.8	2	ESE	0.9	1.6	0	ESE	0.7	1.3	0
SE	1.2	1.7	0	SE	0.9	1.4	0	SE	0.6	1.1	0
SSE	1.1	1.7	0	SSE	0.9	1.5	0	SSE	0.6	1.1	0
S	1.4	1.9	3	S	1.2	1.9	1	S	1.0	1.6	2
SSW	1.5	2.0	6	SSW	1.9	2.9	36	SSW	1.8	2.6	62
SW	1.4	1.9	8	SW	1.9	2.7	41	SW	1.3	2.1	34
WSW	1.4	2.0	15	WSW	1.4	2.2	8	WSW	0.7	1.4	1
W	1.2	1.8	16	W	1.1	1.7	3	W	0.8	1.3	1
WNW	0.9	1.3	0	WNW	1.0	1.5	1	WNW	0.7	1.1	0
NW	0.7	1.3	0	NW	0.7	1.2	0	NW	0.6	1.1	0
NNW	1.3	1.9	5	NNW	1.1	1.7	0	NNW	0.8	1.2	0
N	1.5	2.1	13	N	1.2	1.8	1	N	0.7	1.1	0
LOCATION 59				LOCATION 59				LOCATION 59			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	0.6	1.2	0	NNE	0.8	1.4	0	NNE	0.5	0.9	0
NE	0.8	1.4	2	NE	0.8	1.3	0	NE	0.5	0.8	0
ENE	1.3	2.0	9	ENE	1.6	2.5	9	ENE	0.4	1.0	0
E	1.9	2.5	21	E	1.5	2.3	4	E	0.6	1.4	2
ESE	1.7	2.2	5	ESE	0.8	1.5	0	ESE	0.7	1.3	0
SE	1.6	2.2	2	SE	0.9	1.2	0	SE	0.6	1.0	0
SSE	1.2	1.7	0	SSE	0.8	1.4	0	SSE	0.7	1.2	0
S	1.3	1.9	2	S	1.1	1.9	0	S	1.0	1.6	3
SSW	1.4	1.9	3	SSW	2.0	3.0	23	SSW	1.6	2.4	69
SW	1.4	1.9	5	SW	2.2	3.1	51	SW	0.9	1.7	18
WSW	1.5	2.2	17	WSW	1.6	2.2	5	WSW	0.7	1.2	0
W	1.2	1.9	14	W	1.4	2.0	5	W	0.6	1.2	1
WNW	1.1	1.6	3	WNW	1.3	1.9	3	WNW	0.5	1.0	0
NW	1.0	1.5	2	NW	0.7	1.3	0	NW	0.6	1.0	0
NNW	1.6	2.2	14	NNW	1.0	1.5	0	NNW	0.9	1.4	1
N	1.0	1.6	1	N	0.9	1.5	0	N	0.8	1.4	2
LOCATION 60				LOCATION 60				LOCATION 60			
WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL	WIND ANGLE	RATIOS MEAN	GUST	WEIGHT ANNUAL
NNE	1.5	2.1	5	NNE	1.3	1.8	1	NNE	1.5	2.0	7
NE	1.5	2.0	12	NE	1.0	1.6	2	NE	1.1	1.6	5
ENE	1.3	1.9	4	ENE	1.7	2.2	9	ENE	1.6	2.2	12
E	1.4	2.0	4	E	1.9	2.4	10	E	1.7	2.2	10
ESE	1.3	1.9	1	ESE	1.4	1.9	1	ESE	1.1	1.7	1
SE	1.4	1.9	0	SE	0.9	1.4	0	SE	0.5	0.9	0
SSE	1.5	2.0	0	SSE	0.8	1.3	0	SSE	0.7	1.2	0
S	1.2	1.8	1	S	0.9	1.5	0	S	0.7	1.4	0
SSW	1.7	2.3	8	SSW	0.6	0.6	0	SSW	0.6	1.0	0
SW	1.9	2.4	23	SW	0.7	1.1	0	SW	0.3	0.8	0
WSW	1.8	2.4	21	WSW	1.7	2.3	12	WSW	1.3	1.9	7
W	0.8	1.4	0	W	1.7	2.3	35	W	1.4	2.0	26
WNW	1.1	1.7	4	WNW	1.4	2.1	18	WNW	1.2	1.8	11
NW	1.3	1.9	11	NW	0.6	1.5	0	NW	0.7	1.4	0
NNW	0.9	1.5	0	NNW	0.9	1.6	0	NNW	0.8	1.5	0
N	1.4	2.1	5	N	1.7	2.4	11	N	1.8	2.4	20

TABLE C-60
PEDESTRIAN LEVEL WIND TEST DATA



Appendix D

Traffic Recorder Counts

APPENDIX D

AUTOMATIC TRAFFIC RECORDER COUNT SUMMARIES

- Tremont, south of Ruggles
- Tremont, south of Melnea Cass
- Melnea Cass, west of Tremont
- Ruggles, east of Parker

SASAKI ASSOCIATES, INC.
15 MINUTE, 2 CHANNEL VEHICLE COUNT
COUNT RATIO: 1.00

SITE NO.: 6367.02
IRVINE BLVD. OF RUGGLES
WEDNESDAY OCTOBER 15, 1986

FILE: P18-1WR

HOUR BEGINS	WB 0	WB 15	WB 30	WB 45	WB HOUR TOTAL	EB 0	EB 15	EB 30	EB 45	EB HOUR TOTAL	COMBINED TOTAL
AM											
12	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*
PM											
12	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*
4	*	*	391	441	832	*	*	273	247	520	1352
5	434	398	369	394	1595	266	315	269	270	1120	2715
6	417	428	312	282	1439	253	216	225	238	932	2371
7	265	261	265	219	1009	237	245	263	204	949	1958
8	248	240	175	188	851	234	237	151	148	770	1621
9	194	180	191	195	760	154	133	165	142	594	1354
10	153	164	156	145	618	127	139	145	121	532	1150
11	112	150	171	123	556	96	149	124	116	485	1041
TOTALS					7660					5902	13562

AM PEAK HOUR IS (NO PEAK HOUR)

	WB	EB	COMBINED
VOLUME	*	*	*
DIRECTIONAL SPLIT	*	*	
PEAK HOUR FACTOR	0.00	0.00	0.00

PM PEAK HOUR IS 4:30 TO 5:30

	WB	EB	COMBINED
VOLUME	1664	1101	2765
DIRECTIONAL SPLIT	60%	40%	
PEAK HOUR FACTOR	0.94	0.87	0.97

SASAKI ASSOCIATES, INC.
15 MINUTE, 2 CHANNEL VEHICLE COUNT
COUNT RATIO: 1.00

SITE NO.: 6367.02
FREMONT S. OF RUGGLES
THURSDAY OCTOBER 16, 1986

FILE: P18-THR

HOUR BEGINS	WB 0	WB 15	WB 30	WB 45	WB HOUR TOTAL	EB 0	EB 15	EB 30	EB 45	EB HOUR TOTAL	COMBINED TOTAL
AM											
12	122	117	77	68	384	86	76	60	59	281	665
1	61	50	66	48	225	48	39	33	36	156	381
2	44	50	27	38	159	35	15	25	26	101	260
3	27	30	17	10	84	13	12	22	14	61	145
4	17	24	14	15	70	19	27	15	28	89	159
5	15	15	22	35	87	39	46	74	120	279	366
6	63	100	165	188	516	125	165	240	356	886	1402
7	188	209	205	246	848	332	369	450	526	1677	2525
8	239	193	191	216	839	474	415	521	450	1860	2699
9	211	214	192	198	815	387	350	279	279	1295	2110
10	203	196	180	165	744	237	256	237	227	957	1701
11	214	201	208	209	832	240	244	240	270	994	1826
PM											
12	213	226	227	214	880	255	259	240	270	1024	1904
1	236	240	214	245	935	240	280	283	293	1096	2031
2	248	279	279	292	1098	300	290	329	313	1232	2330
3	294	283	341	407	1325	277	369	345	312	1303	2628
4	414	451	400	394	1659	295	262	304	312	1173	2832
5	414	444	453	402	1713	284	269	295	290	1128	2841
6	355	299	300	283	1237	265	281	273	242	1061	2298
7	257	257	243	240	997	261	223	227	197	908	1905
8	230	211	177	211	829	181	152	148	154	635	1464
9	206	222	190	*	618	176	149	149	*	474	1092
10	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*
TOTALS					16894					18670	35564

AM PEAK HOUR IS 7:45 TO 8:45

	WB		EB		COMBINED:
VOLUME	869	:	1936		2805
DIRECTIONAL SPLIT	31%		69%		
PEAK HOUR FACTOR	0.88		0.92		0.91

PM PEAK HOUR IS 4:45 TO 5:45

	WB		EB		COMBINED:
VOLUME	1705	:	1150		2855
DIRECTIONAL SPLIT	60%		40%		
PEAK HOUR FACTOR	0.94		0.92		0.97

SASAKI ASSOCIATES, INC.
15 MINUTE, 2 CHANNEL VEHICLE COUNT
COUNT RATIO: 1.00

SITE NO.: 6367.02
TREMONT S. OF MELNEA
TUESDAY OCTOBER 14, 1986

FILE: P18-TUM

HOUR BEGINS	EB 0	EB 15	EB 30	EB 45	EB HOUR TOTAL	WB 0	WB 15	WB 30	WB 45	WB HOUR TOTAL	COMBINED TOTAL
AM											
12	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*
PM											
12	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*
4	*	388	355	396	1139	*	511	543	499	1553	2692
5	328	314	295	312	1249	528	625	599	552	2304	3553
6	275	263	250	264	1052	474	446	433	483	1836	2888
7	226	228	234	253	941	419	371	379	336	1505	2446
8	276	255	216	193	940	286	279	195	206	966	1906
9	213	203	177	170	763	219	226	200	215	860	1623
10	197	161	129	160	647	192	186	174	183	735	1382
11	126	125	130	142	523	170	158	146	132	606	1129
TOTALS					7254					10365	17619

AM PEAK HOUR IS (NO PEAK HOUR)

	EB		WB		COMBINED:	
VOLUME	:	*	:	*		*
DIRECTIONAL SPLIT		*		*		
PEAK HOUR FACTOR		0.00		0.00		0.00

PM PEAK HOUR IS 4:30 TO 5:30

	EB		WB		COMBINED:	
VOLUME	:	1393	:	2195		3588
DIRECTIONAL SPLIT		39%		61%		
PEAK HOUR FACTOR		0.88		0.88		0.96

SASAKI ASSOCIATES, INC.
15 MINUTE, 2 CHANNEL VEHICLE COUNT
COUNT RATIO: 1.00

SITE NO.: 6367.02
TREMONT S OF MELNEA
WEDNESDAY OCTOBER 15, 1986

FILE: P19-TUM

HOUR BEGINS	EB 0	EB 15	EB 30	EB 45	EB HOUR TOTAL	WB 0	WB 15	WB 30	WB 45	WB HOUR TOTAL	COMBINED TOTAL
AM											
12	159	189	106	73	527	118	120	97	76	411	938
1	62	42	39	24	167	66	59	35	45	205	372
2	19	20	23	15	77	36	36	57	27	156	233
3	23	18	16	12	69	16	18	27	24	85	154
4	22	25	23	31	101	26	16	33	26	101	202
5	35	45	106	109	295	40	50	64	106	260	555
6	116	150	252	293	811	135	244	335	329	1043	1854
7	333	353	405	456	1547	366	388	359	421	1534	3081
8	460	444	428	462	1794	426	412	391	346	1575	3369
9	420	335	315	296	1366	329	378	350	309	1366	2732
10	294	265	278	264	1101	344	298	325	285	1252	2353
11	260	298	288	306	1152	278	251	311	323	1163	2315
PM											
12	282	282	286	286	1136	357	344	359	350	1410	2546
1	285	271	280	327	1163	359	277	338	359	1333	2496
2	331	326	366	364	1387	391	385	363	435	1574	2961
3	396	525	410	372	1703	392	399	449	507	1747	3450
4	393	377	333	322	1425	486	512	522	612	2132	3557
5	345	279	293	242	1159	583	509	456	607	2155	3314
6	220	253	250	249	972	589	532	444	446	2011	2983
7	248	240	289	249	1026	399	435	335	329	1498	2524
8	367	218	216	174	975	318	241	229	208	996	1971
9	187	236	191	169	783	217	212	223	202	854	1637
10	186	149	167	146	648	193	183	199	177	752	1400
11	124	188	203	227	742	143	176	179	131	629	1371
TOTALS					22126					26242	48368

AM PEAK HOUR IS 7:45 TO 8:45

	EB		WB		COMBINED:
VOLUME	1788	:	1650		3438
DIRECTIONAL SPLIT	52%		48%		
PEAK HOUR FACTOR	0.97		0.97		0.97

PM PEAK HOUR IS 4:15 TO 5:15

	EB		WB		COMBINED:
VOLUME	1377	:	2229		3606
DIRECTIONAL SPLIT	38%		62%		
PEAK HOUR FACTOR	0.91		0.91		0.97

SASAKI ASSOCIATES, INC.
15 MINUTE, 2 CHANNEL VEHICLE COUNT
EQUIV RATIO: 1.00

SITE NO.: 6367.02
TREMONT S. OF MELNEA
THURSDAY OCTOBER 16, 1986

FILE: P18-TWM

HOUR BEGINS	EB 0	EB 15	EB 30	EB 45	HOUR TOTAL	WB 0	WB 15	WB 30	WB 45	HOUR TOTAL	COMBINED TOTAL
AM											
12	152	138	77	77	444	129	111	79	84	403	847
1	56	48	35	44	183	63	71	59	59	252	435
2	31	22	22	30	105	54	49	45	39	187	292
3	21	18	27	21	87	33	23	17	22	95	182
4	27	23	16	45	111	17	23	27	25	92	203
5	42	53	81	112	288	29	47	58	88	222	510
6	123	172	216	313	824	146	227	338	336	1047	1871
7	327	371	383	441	1522	347	378	416	446	1587	3109
8	441	466	458	445	1810	378	362	391	327	1458	3268
9	388	333	327	269	1317	374	339	322	317	1352	2669
10	293	283	251	284	1111	284	311	288	265	1148	2259
11	261	268	300	268	1097	293	301	328	312	1234	2331
PM											
12	281	299	290	288	1158	318	345	333	344	1340	2498
1	308	282	340	327	1257	351	357	319	312	1339	2596
2	360	340	382	382	1464	342	386	392	353	1473	2937
3	373	471	400	401	1645	404	387	484	506	1781	3426
4	344	335	397	401	1477	525	549	472	508	2054	3531
5	332	329	340	343	1344	549	626	572	479	2226	3570
6	316	313	297	256	1182	458	424	387	376	1645	2827
7	270	240	260	259	1029	322	309	299	279	1209	2238
8	228	210	181	220	839	219	255	202	276	952	1791
9	233	186	215	172	806	224	245	208	184	861	1667
10	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*
TOTALS					21100					23957	45057

AM PEAK HOUR IS 7:45 TO 8:45

	EB		WB		COMBINED:
VOLUME	1806		1577		3383
DIRECTIONAL SPLIT	53%		47%		
PEAK HOUR FACTOR	0.97		0.88		0.95

PM PEAK HOUR IS 4:45 TO 5:45

	EB		WB		COMBINED:
VOLUME	1402		2255		3657
DIRECTIONAL SPLIT	38%		62%		
PEAK HOUR FACTOR	0.87		0.90		0.96

SASAKI ASSOCIATES, INC.
15 MINUTE, 2 CHANNEL VEHICLE COUNT
COUNT RATIO: 1.00

SITE NO.: 6367.02
MELNEA W. OF TREMONT
TUESDAY OCTOBER 14, 1986

FILE: P18-MCNT

HOUR BEGINS	NB 0	15	30	45	HOUR TOTAL	SB 0	15	30	45	HOUR TOTAL	COMBINED TOTAL
AM											
12	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*
PM											
12	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*
2	*	57	81	60	198	*	60	111	109	280	478
3	89	77	61	68	295	116	127	147	167	557	852
4	76	86	93	96	351	156	160	150	162	628	979
5	77	81	97	65	320	188	142	131	126	587	907
6	43	53	64	51	211	124	114	114	113	465	676
7	50	59	47	32	188	83	121	145	127	476	664
8	22	16	21	22	81	98	63	79	52	292	373
9	27	22	26	22	97	92	97	75	66	330	427
10	20	22	31	13	86	61	37	32	70	200	286
11	19	12	10	18	59	50	39	52	42	183	242
TOTALS					1886					3998	5884

AM PEAK HOUR IS (NO PEAK HOUR)

	NB		SB		COMBINED:
VOLUME		*		*	*
DIRECTIONAL SPLIT		*		*	
PEAK HOUR FACTOR		0.00		0.00	0.00

PM PEAK HOUR IS 4:15 TO 5:15

	NB		SB		COMBINED:
VOLUME		352		660	1012
DIRECTIONAL SPLIT		35%		65%	
PEAK HOUR FACTOR		0.92		0.88	0.95

SASAKI ASSOCIATES, INC.
15 MINUTE, 2 CHANNEL VEHICLE COUNT
COUNT RATIO: 1.00

SITE NO : 6367.02
MELNEA W OF TREMONT
WEDNESDAY OCTOBER 15, 1986

FILE: P18-MCNT

HOUR BEGINS	NB 0	NB 15	NB 30	NB 45	HOUR TOTAL	SB 0	SB 15	SB 30	SB 45	HOUR TOTAL	COMBINED TOTAL
AM											
12	7	10	10	5	32	41	36	30	14	121	153
1	7	4	0	4	15	21	8	11	11	51	66
2	1	2	2	3	8	16	13	5	6	40	48
3	1	2	0	2	5	4	4	12	6	26	31
4	4	4	3	4	15	4	5	5	1	15	30
5	4	11	23	30	68	2	12	7	16	37	105
6	38	66	118	120	342	20	29	28	48	125	467
7	136	194	176	195	691	40	45	59	62	206	897
8	174	147	139	142	602	43	86	69	68	266	868
9	120	87	188	156	551	85	92	65	65	297	848
10	112	100	108	86	406	75	67	72	57	271	677
11	61	68	117	73	319	50	56	95	60	262	581
PM											
12	72	76	60	95	303	68	67	69	99	303	606
1	52	73	45	58	228	64	89	55	71	279	507
2	53	*	*	*	53	76	*	*	*	76	129
3	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*
TOTALS					3638					2375	6013

AM PEAK HOUR IS 7:15 TO 8:15

	NB		SB		COMBINED:
VOLUME	729	:	209		938
DIRECTIONAL SPLIT	78%		22%		
PEAK HOUR FACTOR	0.94		0.84		0.95

PM PEAK HOUR IS 12:00 TO 1:00

	NB		SB		COMBINED:
VOLUME	303	:	303		606
DIRECTIONAL SPLIT	50%		50%		
PEAK HOUR FACTOR	0.80		0.77		0.78

SASAKI ASSOCIATES, INC.
15 MINUTE, 2 CHANNEL VEHICLE COUNT
COUNT RATIO: 1.00

SITE NO.: 5513.01
RUGGLES E. OF PARKER
WEDNESDAY JUNE 4, 1986

FILE: RUGG5513

HOUR BEGINS	SB 0	15	30	45	HOUR TOTAL	NB 0	15	30	45	HOUR TOTAL	COMBINED TOTAL
AM											
12	*	*	*	*	*	*	*	*	*	*	*
1	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	65	85	*	*	*	286	286	371
PM											
12	27	17	17	8	69	260	276	289	277	1102	1171
1	12	13	15	6	46	303	282	278	293	1156	1202
2	22	17	11	9	59	332	299	311	345	1287	1346
3	29	26	23	12	90	386	347	397	376	1506	1596
4	10	14	9	15	48	416	359	397	394	1566	1614
5	7	6	7	10	30	372	395	396	353	1516	1546
6	8	6	12	5	31	334	319	316	291	1260	1291
7	7	4	5	5	21	275	293	276	265	1109	1130
8	4	6	6	5	21	260	234	209	188	891	912
9	6	5	5	5	21	218	217	198	218	851	872
10	3	4	4	6	17	183	213	205	212	813	830
11	6	4	4	4	18	184	134	115	126	559	577
TOTALS					556					13902	14458

AM PEAK HOUR IS 11:00 TO 12:00

	SB	NB	COMBINED:
VOLUME	85	286	371
DIRECTIONAL SPLIT	23%	77%	
PEAK HOUR FACTOR	0.25	0.25	0.25

PM PEAK HOUR IS 4:00 TO 5:00

	SB	NB	COMBINED:
VOLUME	48	1566	1614
DIRECTIONAL SPLIT	3%	97%	
PEAK HOUR FACTOR	0.80	0.94	0.95

SASAKI ASSOCIATES, INC.
15 MINUTE, 2 CHANNEL VEHICLE COUNT
COUNT RATIO: 1.00

SITE NO.: 5513.01
RUGGLES E. OF PARKER
THURSDAY JUNE 5, 1986

FILE: RUGG5513

HOUR BEGINS	SB 0	15	30	45	HOUR TOTAL	NB 0	15	30	45	HOUR TOTAL	COMBINED TOTAL
AM											
12	4	4	4	5	17	120	93	75	49	337	354
1	4	5	4	5	18	48	57	37	33	175	193
2	4	5	5	4	18	29	40	25	25	119	137
3	5	4	4	6	19	15	19	16	17	67	86
4	4	4	5	6	19	19	18	12	21	70	89
5	6	5	5	5	21	20	35	51	73	179	200
6	5	6	4	9	24	104	154	199	259	716	740
7	5	7	29	34	75	240	298	345	348	1231	1306
8	17	17	17	16	67	297	317	373	348	1335	1402
9	10	25	15	10	60	341	322	308	273	1244	1304
10	8	5	11	12	36	259	235	285	261	1040	1076
11	9	9	6	6	30	252	264	236	302	1054	1084
PM											
12	8	*	*	*	8	284	*	*	*	284	292
1	*	*	*	*	*	*	*	*	*	*	*
2	*	*	*	*	*	*	*	*	*	*	*
3	*	*	*	*	*	*	*	*	*	*	*
4	*	*	*	*	*	*	*	*	*	*	*
5	*	*	*	*	*	*	*	*	*	*	*
6	*	*	*	*	*	*	*	*	*	*	*
7	*	*	*	*	*	*	*	*	*	*	*
8	*	*	*	*	*	*	*	*	*	*	*
9	*	*	*	*	*	*	*	*	*	*	*
10	*	*	*	*	*	*	*	*	*	*	*
11	*	*	*	*	*	*	*	*	*	*	*
TOTALS					412					7851	8263

AM PEAK HOUR IS 8:30 TO 9:30

VOLUME	SB : 68	NB : 1384	COMBINED:	1452
DIRECTIONAL SPLIT	5%	95%		
PEAK HOUR FACTOR	0.68	0.93		0.93

PM PEAK HOUR IS 12:00 TO 1:00

VOLUME	SB : 8	NB : 284	COMBINED:	292
DIRECTIONAL SPLIT	3%	97%		
PEAK HOUR FACTOR	0.25	0.25		0.25

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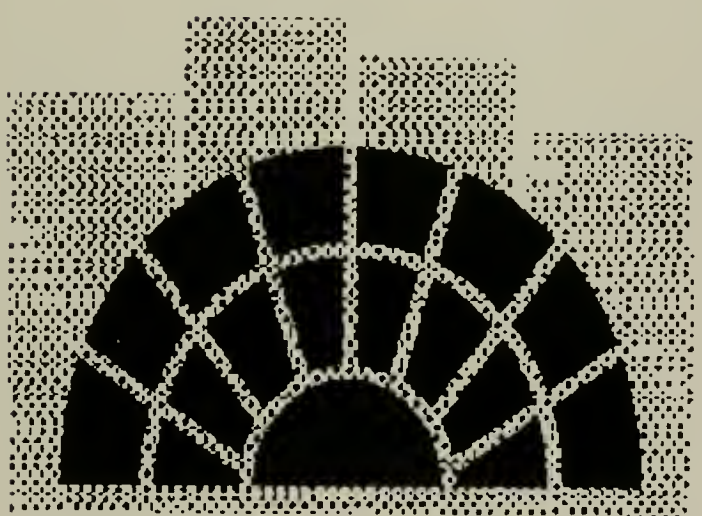
Boston, Mass. 02201



Appendix E
Intersection Turning Counts

APPENDIX E

INTERSECTION TURNING MOVEMENT COUNT SUMMARIES
(AM, PM AND SAT PEAK HOURS)

- Tremont/Ruggles/Whittier
- Tremont/Melnea Cass
- Tremont/Ruggles South
- Ruggles/Busway
- Tremont/Prentiss
- Huntington/Ruggles
- Tremont/Columbus/New Dudley
- Parker/Ruggles
- Melnea Cass/Columbus/Busway
- Melnea Cass/Washington
- Melnea Cass/Massachusetts/Southampton/ Expressway Ramps

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY:
ALL VEHICLES

INTERSECTION: Ruggles, Whittier, Tremont PROJECT: Parcel 18 DEIR FILE: p18int1
DAY: Thursday WEATHER:
TOWN/CITY: Boston DATE: September 29, 1988 SURVEYOR:

STREET	Tremont Street Northbound			Ruggles Street Eastbound			Tremont Street Southbound			Whittier Street Westbound				
APPROACH MOVEMENT	L	TH	R	L	TH	R	L	TH	R	L	TH	R	15 MIN	HOUR
COUNT #	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7:00-7:15	85	189		81		24		180	158	0	0	0	717	
7:15-7:30	87	229		78		34		166	196	6	6	2	804	
7:30-7:45	129	326		143		67		185	209	0	9	5	1073	
7:45-8:00	129	320		134		56		186	180	13	10	6	1034	3628
8:00-8:15	109	359		164		57		203	195	12	11	11	1121	4032
8:15-8:30	99	342		159		60		217	204	6	6	1	1094	4322
8:30-8:45	81	261		162		79		201	212	10	10	4	1020	4269
8:45-9:00	134	361		136		76		174	187	7	5	5	1085	4320
movement total	853	2387	0	1057	0	453	0	1512	1541	54	57	34		
approach total		3240			1510			3053			145		7948	
4:00-4:15 PM	68	257		172		88		247	197	9	5	9	1052	
4:15-4:30	70	253		200		86		251		6	1	7	874	
4:30-4:45	72	222		208		85		268	197	8	3	11	1074	
4:45-5:00	86	252		236		88		303	204	5	3	9	1186	4186
5:00-5:15	71	241		198		69		318	212	8	7	8	1132	4266
5:15-5:30	88	303		202		63		285	284	16	4	6	1251	4643
5:30-5:45	82	251		170		85		302	228	6	4	0	1128	4697
5:45-6:00	115	242		209		64		285	176	9	4	6	1110	4621
movement total	652	2021	0	1595	0	628	0	2259	1498	67	31	56		
approach total		2673			2223			3757			154		8807	

AM PEAK HOUR PERIOD: 7:30 - 8:30 AM

PM PEAK HOUR PERIOD: 4:45 - 5:45 PM

AM PEAK HOUR:														
movement total	423	1323	0	621	0	272	0	795	798	35	32	21		
approach total		1746			893			1593			88		4320	
approach PHF		0.93			1.01			0.95			0.65		0.96	
PM PEAK HOUR:														
movement total	327	1047	0	806	0	305	0	1208	928	35	18	23		
approach total		1374			1111			2136			76		4697	
approach PHF		0.88			0.86			1.01			0.73		0.94	

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY:
ALL VEHICLES

INTERSECTION: Ruggles, Whittier, Tremont PROJECT: Parcel 18 DEIR FILE: intlsat
DAY: Saturday WEATHER:
TOWN/CITY: Boston DATE: October 15,1988 SURVEYOR:

STREET APPROACH	Tremont Street Northbound			Ruggles Street Eastbound			Tremont Street Southbound			Whittier Street Westbound				
MOVEMENT COUNT #	L 1	TH 2	R 3	L 4	TH 5	R 6	L 7	TH 8	R 9	L 10	TH 11	R 12	15 MIN TOTAL	HOUR TOTAL
1:00-1:15	51	225	1	99		36	210		57	0	6	0	685	
1:15-1:30	51	231	0	110		59	237		51	2	5	3	749	
1:30-1:45	48	256	0	105		59	219		112	9	8	6	822	
1:45-2:00	64	236	0	127		39	286		108	6	0	3	869	3125
2:00-2:15	74	225	1	107		49	242		79	5	2	1	785	3225
2:15-2:30	77	252	0	110		54	240		88	3	4	3	831	3307
2:30-2:45	60	277	0	140		57	238		96	1	3	0	872	3357
2:45-3:00	77	265	0	141		63	279		105	4	6	1	941	3429
3:00-3:15	48	238	0	134		54	239		78	3	3	2	799	3443
3:15-3:30	66	212	0	131		62	252		92	4	0	1	820	3432
3:30-3:45	66	237	0	144		76	284		79	3	3	1	893	3453
3:45-4:00	45	207	0	141		58	297		106	3	3	0	860	3372
movement total	727	2861	2	1489	0	666	0	3023	1051	43	43	21		
approach total		3590			2155			4074			107		9926	

SAT PEAK HOUR PERIOD: 2:45 - 3:45 PM

SAT PEAK HOUR:

movement total	257	952	0	550	0	255	0	1054	354	14	12	5		
approach total		1209			805			1408			31		3453	
approach PHF		0.88			0.91			0.92			0.70		0.92	

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY:
ALL VEHICLES

INTERSECTION: Tremont, Melnea Cass | PROJECT: Parcel 18 DEIR | FILE: p18int2
DAY: Thursday | WEATHER:
TOWN/CITY: Boston | DATE: September 29, 1988 | SURVEYOR:

STREET	Tremont Street Northbound			Melnea Cass Highway Eastbound			Tremont Street Southbound			Melnea Cass Highway Westbound				
APPROACH MOVEMENT	L	TH	R	L	TH	R	L	TH	R	L	TH	R	15 MIN	HOUR
COUNT #	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7:00-7:15	81	136	94	0	7	57	13	55	0	242	16	6	707	
7:15-7:30	98	134	100	0	14	88	10	60	3	244	34	10	762	
7:30-7:45	120	127	113	0	23	81	12	67	2	239	63	15	832	
7:45-8:00	133	178	119	0	18	94	12	78	2	264	59	14	931	3232
8:00-8:15	146	231	123	0	15	97	15	90	0	288	51	18	1034	3559
8:15-8:30	126	219	120	1	19	92	8	108	1	272	57	13	994	3791
8:30-8:45	105	204	129	3	21	97	6	126	0	255	54	9	969	3928
8:45-9:00	139	163	114	0	9	62	26	117	0	251	52	20	952	3949
movement total	948	1392	912	4	126	448	102	701	8	2055	386	105		
approach total		3252			578			811			2546		7181	
4:00-4:15 PM	33	126	121	0	61	162	9	155	3	219	25	9	923	
4:15-4:30	48	157	149	0	45	153	9	115	1	235	33	7	949	
4:30-4:45	69	186	167	0	27	135	12	73	0	252	48	6	975	
4:45-5:00	76	160	131	0	38	122	16	110	2	271	50	11	987	3834
5:00-5:15	87	141	122	0	45	117	18	144	6	294	60	15	1049	3960
5:15-5:30	90	149	159	0	62	124	20	140	4	300	62	10	1120	4131
5:30-5:45	99	157	158	0	75	135	18	147	3	293	69	9	1163	4319
5:45-6:00	93	134	119	0	39	139	21	141	3	182	25	21	917	4249
movement total	595	1210	1126	0	392	1084	123	1025	22	2046	372	88		
approach total		2931			1476			1170			2506		8083	

AM PEAK HOUR PERIOD: 8:00 - 9:00 AM

PM PEAK HOUR PERIOD: 4:45 - 5:45 PM

AM PEAK HOUR:														
movement total	516	817	486	4	64	228	55	441	1	1066	214	60		
approach total		1819			293			497			1340		3949	
approach PHF		0.91			0.90			0.87			0.94		0.95	

PM PEAK HOUR:														
movement total	352	607	570	0	220	498	72	541	15	1158	241	45		
approach total		1529			718			628			1444		4319	
approach PHF		0.92			0.85			0.93			0.97		0.93	

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY:
ALL VEHICLES

INTERSECTION: Tremont, Melnea Cass | PROJECT: Parcel 18 DEIR | FILE: int2sat
DAY: Saturday | WEATHER: rainy
TOWN/CITY: Boston | DATE: October 22,1988 | SURVEYOR: KT

STREET	Tremont Street Northbound			Melnea Cass Highway Eastbound			Tremont Street Southbound			Melnea Cass Highway Westbound				
APPROACH MOVEMENT	L	TH	R	L	TH	R	L	TH	R	L	TH	R	15 MIN TOTAL	HOUR TOTAL
COUNT #	1	2	3	4	5	6	7	8	9	10	11	12		
1:00-1:15	43	196	103	4	9	69	5	97	4	171	26	26	753	
1:15-1:30	52	144	164	2	20	77	17	129	3	126	21	21	776	
1:30-1:45	44	199	132	1	11	65	15	78	11	143	20	20	739	
1:45-2:00	55	182	159	1	8	61	29	108	5	142	18	18	756	3024
2:00-2:15	39	163	151	2	16	78	31	81	6	104	24	24	719	2990
2:15-2:30	28	164	146	0	23	83	22	137	10	133	22	22	790	3004
2:30-2:45	51	156	186	0	17	64	11	126	8	121	27	27	804	3069
2:45-3:00	52	159	132	1	22	82	14	134	2	146	26	26	796	3109
3:00-3:15	68	203	145	0	14	84	19	116	6	207	35	35	932	3322
3:15-3:30	55	219	134	4	16	61	33	175	11	179	20	20	927	3459
3:30-3:45	69	193	180	0	21	78	11	99	5	164	25	25	870	3525
3:45-4:00	58	164	155	2	17	88	18	120	3	158	24	24	831	3560
movement total	614	2122	1787	17	194	890	225	1400	74	1794	288	288		
approach total		4523			1101			1699			2370		9693	

SAT PEAK HOUR PERIOD: 3:00 - 4:00 PM

SAT PEAK HOUR:

movement total	250	779	614	6	68	311	81	510	25	708	104	104		
approach total		1643			385			616			916		3560	
approach PHF		0.99			0.90			0.70			0.83		0.95	

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY:
ALL VEHICLES

5

INTERSECTION: Tremont, Ruggles(N. Int.) PROJECT: Parcel 18 DEIR FILE: p18int3
DAY: Thursday WEATHER:
TOWN/CITY: Boston DATE: September 29, 1988 SURVEYOR:

STREET	Tremont Street			Ruggles Street			Tremont Street			Ruggles Street Westbound				
APPROACH	~~Southbound~~													
MOVEMENT	L	TH	R	L	TH	R	L	TH	R	L	TH	R	15 MIN	HOUR
COUNT #	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7:00-7:15		278	18									2	298	
7:15-7:30		325	31									1	357	
7:30-7:45		311	45									0	356	
7:45-8:00		425	40									0	465	1476
8:00-8:15		481	57									0	538	1716
8:15-8:30		475	38									0	513	1872
8:30-8:45		439	52									0	491	2007
8:45-9:00		468	31									0	499	2041
movement total	0	3202	312	0	0	0	0	0	0	0	0	3		
approach total		3514			0			0			3		3517	
4:00-4:15 PM		409	57									0	466	
4:15-4:30		412	43									0	455	
4:30-4:45		415	42									0	457	
4:45-5:00		442	49									0	491	1969
5:00-5:15		318	50									0	368	1771
5:15-5:30		403	59									1	463	1779
5:30-5:45		412	31									2	445	1767
5:45-6:00		417	41									0	458	1734
movement total	0	3228	372	0	0	0	0	0	0	0	0	3		
approach total		3600			0			0			3		3603	

AM PEAK HOUR PERIOD: 8:00 - 9:00 AM

PM PEAK HOUR PERIOD: 4:00 - 5:00 PM

AM PEAK HOUR:

movement total	0	1863	178	0	0	0	0	0	0	0	0	0		
approach total		2041			0			0			0		2041	
approach PHF		0.95			ERR			ERR			ERR		0.95	

PM PEAK HOUR:

movement total	0	1678	191	0	0	0	0	0	0	0	0	0		
approach total		1869			0			0			0		1869	
approach PHF		0.95			ERR			ERR			ERR		0.95	

EDWARD STEIN-BUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY:
ALL VEHICLES

5

INTERSECTION: Tremont, Ruggles(N. Int.) PROJECT: Parcel 18 DEIR FILE: int3sat
DAY: Saturday WEATHER:
TOWN/CITY: Boston DATE: October 15,1988 SURVEYOR:

STREET	Tremont Street			Ruggles Street			Tremont Street			Ruggles Street				
APPROACH	~~Southbound~~ NB									Westbound				
MOVEMENT	L	TH	R	L	TH	R	L	TH	R	L	TH	R	15 MIN	HOUR
COUNT #	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
1:00-1:15		301	20									1	322	
1:15-1:30		335	22									2	359	
1:30-1:45		341	33									0	374	
1:45-2:00		331	32									1	364	1419
2:00-2:15		319	19									2	340	1437
2:15-2:30		333	31									0	364	1442
2:30-2:45		378	36									0	414	1482
2:45-3:00		380	31									0	411	1529
3:00-3:15		344	30									0	374	1563
3:15-3:30		321	31									1	353	1552
3:30-3:45		351	30									0	381	1519
3:45-4:00		325	35									0	360	1468
movement total	0	4059	350	0	0	0	0	0	0	0	0	7		
approach total		4409			0			0			7		4416	

SAT PEAK HOUR PERIOD: 2:15 - 3:15 PM

SAT PEAK HOUR:

movement total	0	1435	128	0	0	0	0	0	0	0	0	0		
approach total		1563			0			0			0		1563	
approach PHF		0.94			ERR			ERR			0.00		0.94	

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY:
ALL VEHICLES

INTERSECTION: Ruggles Street, Busway PROJECT: Parcel 18 DEIR FILE: p18int4
DAY: Thursday WEATHER:
TOWN/CITY: Boston DATE: September 29, 1988 SURVEYOR:

STREET				Ruggles Street Eastbound			Busway Southbound			~~Busway~~ ~~Northbound~~				
APPROACH														
MOVEMENT	L	TH	R	L	TH	R	L	TH	R	L	TH	R	15 MIN	HOUR
COUNT #	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7:00-7:15				4	96		14		15		185	12	326	
7:15-7:30				4	116		19		23		212	14	388	
7:30-7:45				5	181		11		30		266	25	518	
7:45-8:00				4	219		4		26		285	25	563	1795
8:00-8:15				5	201		4		22		179	22	433	1902
8:15-8:30				4	204		5		23		167	25	428	1942
8:30-8:45				1	186		10		28		209	31	465	1889
8:45-9:00				6	181		10		5		297	7	506	1832
movement total	0	0	0	33	1384	0	77	0	172	0	1800	161		
approach total		0			1417			249			1961		3627	
4:00-4:15 PM				9	244		13		5		247	7	525	
4:15-4:30				2	235		19		4		211	20	491	
4:30-4:45				2	262		23		5		210	11	513	
4:45-5:00				2	264		19		4		254	12	555	2084
5:00-5:15				1	233		17		4		223	18	496	2055
5:15-5:30				1	211		18		3		299	18	550	2114
5:30-5:45				1	242		24		2		265	20	554	2155
5:45-6:00				2	213		27		0		268	19	529	2129
movement total	0	0	0	20	1904	0	160	0	27	0	1977	125		
approach total		0			1924			187			2102		4213	

AM PEAK HOUR PERIOD: 7:30 - 8:30AM

PM PEAK HOUR PERIOD: 4:45 - 5:45 PM

AM PEAK HOUR:

movement total	0	0	0	18	805	0	24	0	101	0	897	97		
approach total		0			823			125			994		1942	
approach PHF		ERR			0.92			0.76			0.80		0.86	

PM PEAK HOUR:

movement total	0	0	0	5	950	0	78	0	13	0	1041	68		
approach total		0			955			91			1109		2155	
approach PHF		ERR			0.90			0.88			0.87		0.97	

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY:
ALL VEHICLES

INTERSECTION: Ruggles Street, Busway
TOWN/CITY: Boston

PROJECT: Parcel 18 DEIR
DAY: Saturday
DATE: October 15,1988

FILE: int4sat
WEATHER:
SURVEYOR: PS

STREET APPROACH				Ruggles Street Eastbound			Busway Southbound			~~Busway~~ Ruggles Northbound WB				
MOVEMENT	L	TH	R	L	TH	R	L	TH	R	L	TH	R	15 MIN TOTAL	HOUR TOTAL
COUNT #	1	2	3	4	5	6	7	8	9	10	11	12		
1:00-1:15				6	140		12		2		127	4	291	
1:15-1:30				7	157		18		2		167	6	357	
1:30-1:45				7	177		18		0		155	4	361	
1:45-2:00				5	255		10		3		211	10	494	1503
2:00-2:15				4	164		18		2		185	10	383	1595
2:15-2:30				6	178		14		3		161	8	370	1608
2:30-2:45				4	213		8		2		216	10	453	1700
2:45-3:00				2	191		18		2		180	16	409	1615
3:00-3:15				1	205		14		3		161	10	394	1626
3:15-3:30				2	241		18		2		221	8	492	1748
3:30-3:45				3	297		16		5		200	10	531	1826
3:45-4:00				4	244		18		3		181	6	456	1873
movement total	0	0	0	51	2462	0	182	0	29	0	2165	102		
approach total		0			2513			211			2267		4991	

SAT PEAK HOUR PERIOD: 3:00 - 4:00 PM

SAT PEAK HOUR:

movement total	0	0	0	10	987	0	66	0	13	0	763	34		
approach total		0			997			79			797		1873	
approach PHF		ERR			0.83			0.94			0.87		0.88	

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY:
ALL VEHICLES

INTERSECTION: Tremont & Prentiss | PROJECT: Parcel 18 DEIR | FILE: p18int5
TOWN/CITY: Boston | DAY: Wednesday | WEATHER:
DATE: October 12,1988 | SURVEYOR:

STREET	Tremont Street Northbound			Prentiss Street Eastbound			Tremont Street Southbound							
APPROACH MOVEMENT	L	TH	R	L	TH	R	L	TH	R	L	TH	R	15 MIN TOTAL	HOUR TOTAL
COUNT #	1	2	3	4	5	6	7	8	9	10	11	12		
7:00-7:15													0	
7:15-7:30	66	390		19		12		205	23				715	
7:30-7:45	74	514		10		3		192	33				826	
7:45-8:00	83	466		28		7		219	29				832	2373
8:00-8:15	44	431		18		7		241	21				762	3135
8:15-8:30	60	439		6		5		236	28				774	3194
8:30-8:45	48	437		12		3		224	21				745	3113
8:45-9:00	46	441		14		5		233	21				760	3041
movement total	421	3118	0	107	0	42	0	1550	176	0	0	0		
approach total		3539			149			1726			0		5414	
4:00-4:15 PM	20	327		33		20		398	29				827	
4:15-4:30	25	295		26		8		388	17				759	
4:30-4:45	22	371		24		16		393	21				847	
4:45-5:00	19	292		29		12		399	26				777	3210
5:00-5:15	33	339		19		11		393	19				814	3197
5:15-5:30	24	344		13		18		371	22				792	3230
5:30-5:45	23	301		17		23		417	24				805	3188
5:45-6:00	20	288		16		17		375	21				737	3148
movement total	186	2557	0	177	0	125	0	3134	179	0	0	0		
approach total		2743			302			3313			0		6358	

AM PEAK HOUR PERIOD: 7:30 - 8:30 AM

PM PEAK HOUR PERIOD: 4:30 - 5:30 PM

AM PEAK HOUR:														
movement total	261	1850	0	62	0	22	0	888	111	0	0	0		
approach total		2111			84			999			0		3194	
approach PHF		0.90			0.60			0.95			ERR		0.96	
PM PEAK HOUR:														
movement total	98	1346	0	85	0	57	0	1556	88	0	0	0		
approach total		1444			142			1644			0		3230	
approach PHF		0.92			0.87			0.97			ERR		0.95	

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY:
ALL VEHICLES

INTERSECTION: Tremont & Prentiss | PROJECT: Parcel 18 DEIR | FILE: int5sat
DAY: Saturday | WEATHER:
TOWN/CITY: Boston | DATE: October 15,1988 | SURVEYOR:

STREET	Tremont Street			Prentiss Street			Tremont Street							
APPROACH	Northbound			Eastbound			Southbound							
MOVEMENT	L	TH	R	L	TH	R	L	TH	R	L	TH	R	15 MIN	HOUR
COUNT #	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
1:00-1:15	258	6											264	
1:15-1:30	345	10		13		6		223	10				607	
1:30-1:45	330	19		8		10		245	12				624	
1:45-2:00	440	17		17		6		275	12				767	2262
2:00-2:15	324	11		11		5		264	6				621	2619
2:15-2:30	374	14		4		5		226	21				644	2656
2:30-2:45	360	11		3		6		225	15				620	2652
2:45-3:00	389	14		9		4		252	11				679	2564
3:00-3:15	385	9		9		6		265	12				686	2629
3:15-3:30	370	15		4		5		334	11				739	2724
3:30-3:45	355	8		3		4		321	8				699	2803
3:45-4:00	360	17		6		8		381	8				780	2904
movement total	4290	151	0	87	0	65	0	3011	126	0	0	0		
approach total		4441			152			3137			0		7730	

SAT PEAK HOUR PERIOD: 3:00 - 4:00 PM

SAT PEAK HOUR:

movement total	1470	49	0	22	0	23	0	1301	39	0	0	0		
approach total		1519			45			1340			0		2904	
approach PHF		0.96			0.75			0.86			ERR		0.93	

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY:
ALL VEHICLES

INTERSECTION: Huntington Ave. & Ruggles PROJECT: Parcel 18 DEIR FILE: p18int6
DAY: Wednesday WEATHER: sunny
TOWN/CITY: Boston DATE: October 12,1988 SURVEYOR: CES

STREET	Huntington Ave.			Ruggles Street			Huntington Ave.			Ruggles St.				
APPROACH	Northbound			Eastbound			Southbound			Westbound				
MOVEMENT	L	TH	R	L	TH	R	L	TH	R	L	TH	R	15 MIN	HOUR
COUNT #	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7:00-7:15	9	121	41	8	68	2	3	100	19	26	128	4	529	
7:15-7:30	2	122	27	5	110	1	5	112	19	25	153	3	584	
7:30-7:45	5	168	71	4	122	4	18	113	18	41	143	5	712	
7:45-8:00	3	150	73	1	98	2	19	120	29	40	130	1	666	2491
8:00-8:15	6	166	46	6	109	5	8	157	44	44	151	8	750	2712
8:15-8:30	2	101	39	1	94	0	2	156	30	44	141	0	610	2738
8:30-8:45	2	173	49	5	85	8	10	154	37	36	143	7	709	2735
8:45-9:00	3	129	59	6	78	9	6	151	38	46	117	2	644	2713
movement total	32	1130	405	36	764	31	71	1063	234	302	1106	30		
approach total		1567			831			1368			1438		5204	
4:00-4:15 PM	2	48	96	15	111	15	7	213	19	39	162	13	740	
4:15-4:30	1	116	58	22	106	10	12	194	20	32	152	12	735	
4:30-4:45	1	166	69	13	117	12	16	183	26	74	108	12	797	
4:45-5:00	3	148	103	23	109	8	18	184	13	80	165	19	873	3145
5:00-5:15	0	216	130	20	99	11	22	151	22	64	177	12	924	3329
5:15-5:30	2	249	146	27	154	5	10	209	29	95	194	20	1140	3734
5:30-5:45	1	138	82	11	96	13	9	137	21	50	144	11	713	3650
5:45-6:00	0	158	115	16	122	5	20	169	18	67	145	8	843	3620
movement total	10	1239	799	147	914	79	114	1440	168	501	1247	107		
approach total		2048			1140			1722			1855		6765	

AM PEAK HOUR PERIOD: 7:30 - 8:30 AM

PM PEAK HOUR PERIOD: 4:30 - 5:30 PM

AM PEAK HOUR:														
movement total	16	585	229	12	423	11	47	546	121	169	565	14		
approach total		830			446			714			748		2738	
approach PHF		0.85			0.86			0.85			0.92		0.91	
PM PEAK HOUR:														
movement total	6	779	448	83	479	36	66	727	90	313	644	63		
approach total		1233			598			883			1020		3734	
approach PHF		0.78			0.80			0.89			0.83		0.82	

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY:
ALL VEHICLES

INTERSECTION: Huntington Ave. & Ruggles PROJECT: Parcel 18 DEIR FILE: int6sat
DAY: Saturday WEATHER:
TOWN/CITY: Boston DATE: October 15,1988 SURVEYOR:

STREET	Huntington Ave			Ruggles Street			Huntington Ave.			Ruggles St				
APPROACH	Northbound			Eastbound			Southbound			Westbound				
MOVEMENT	L	TH	R	L	TH	R	L	TH	R	L	TH	R	15 MIN	HOUR
COUNT #	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
1:00-1:15	6	141	28	12	70	9	35	147	13	22	87	14	584	
1:15-1:30	9	163	31	16	92	6	10	169	18	46	104	13	677	
1:30-1:45	2	163	28	11	76	11	7	145	23	34	87	9	596	
1:45-2:00	9	124	32	7	74	9	10	140	24	3	59	16	507	2364
2:00-2:15	0	126	12	12	70	6	12	145	29	39	76	3	530	2310
2:15-2:30	6	132	21	7	63	7	7	145	21	22	70	2	503	2136
2:30-2:45	2	126	15	15	72	3	2	185	18	35	64	3	540	2080
2:45-3:00	12	161	35	12	61	15	27	182	24	33	78	6	646	2219
3:00-3:15	6	207	48	15	76	9	6	198	31	39	92	0	727	2416
3:15-3:30	3	166	30	9	72	4	15	162	33	39	84	12	629	2542
3:30-3:45	2	222	57	13	76	5	22	208	33	24	78	6	746	2748
3:45-4:00	4	198	40	17	77	12	4	185	21	31	105	10	704	2806
movement total	61	1929	377	146	879	96	157	2011	288	367	984	94		
approach total		2367			1121			2456			1445		7389	

SAT PEAK HOUR PERIOD: 3:00 - 4:00 PM

SAT PEAK HOUR:

movement total	15	793	175	54	301	30	47	753	118	133	359	28		
approach total		983			385			918			520		2806	
approach PHF		0.87			0.91			0.87			0.89		0.94	

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY:
ALL VEHICLES

INTERSECTION: Tremont,Columbus, & New Dudley
TOWN/CITY: Boston
PROJECT: Parcel 18 DEIR
DAY: Wednesday
DATE: October 12,1988
FILE: p18int7
WEATHER: fair
SURVEYOR: Lee

STREET	Columbus Northbound			Tremont Eastbound			Tremont Street Southbound			New Dudley Westbound				
APPROACH														
MOVEMENT	L	TH	R	L	TH	R	L	TH	R	L	TH	R	15 MIN	HOUR
COUNT #	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7:00-7:15	84	261	25	26	51	27	30	93	32	3	60	58	750	
7:15-7:30	95	311	32	36	60	34	33	104	41	5	86	62	899	
7:30-7:45	99	359	24	33	57	60	47	126	26	18	108	54	1011	
7:45-8:00	104	378	14	47	50	49	49	96	33	15	114	61	1010	3670
8:00-8:15	108	409	8	60	39	40	42	81	40	7	119	62	1015	3935
8:15-8:30	89	422	11	42	66	51	63	145	32	3	79	31	1034	4070
8:30-8:45	101	391	10	69	60	44	36	141	24	9	94	54	1033	4092
8:45-9:00	99	432	17	35	46	63	36	132	70	5	83	97	1115	4197
movement total	779	2963	141	348	429	368	336	918	298	65	743	479		
approach total		3883			1145			1552			1287		7867	
4:00-4:15 PM	49	144	6	61	75	80	44	261	32	14	60	16	842	
4:15-4:30	72	198	2	43	70	92	51	295	30	10	64	15	942	
4:30-4:45	97	270	0	32	75	100	58	330	21	3	95	12	1093	
4:45-5:00	60	225	2	43	77	118	42	310	30	11	73	28	1019	3896
5:00-5:15	59	190	1	70	59	110	49	301	42	14	80	33	1008	4062
5:15-5:30	63	167	0	94	48	119	42	288	53	18	93	57	1042	4162
5:30-5:45	60	187	1	81	50	115	45	294	47	21	72	60	1033	4102
5:45-6:00	63	210	3	65	45	100	51	309	45	21	57	66	1035	4118
movement total	523	1591	15	489	499	834	382	2388	300	112	594	287		
approach total		2129			1822			3070			993		8014	

AM PEAK HOUR PERIOD: 8:00 - 9:00 AM

PM PEAK HOUR PERIOD: 4:30 - 5:30 PM

AM PEAK HOUR:

movement total	397	1654	46	206	211	198	177	499	166	24	375	244		
approach total		2097			615			842			643		4197	
approach PHF		0.96			0.89			0.88			0.86		0.94	

PM PEAK HOUR:

movement total	279	852	3	339	259	447	191	1229	146	46	341	130		
approach total		1134			945			1566			517		4162	
approach PHF		0.77			0.91			0.96			0.77		0.95	

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY:
ALL VEHICLES

INTERSECTION: Tremont, Columbus, & New Dudley
TOWN/CITY: Boston
PROJECT: Parcel 18 DEIR
DAY: Saturday
DATE: October 22,1988
FILE: int7sat
WEATHER: rainy
SURVEYOR: Leo

STREET	Columbus			Tremont			Tremont Street			New Dudley				
APPROACH	Northbound			Eastbound			Southbound			Westbound				
MOVEMENT	L	TH	R	L	TH	R	L	TH	R	L	TH	R	15 MIN	HOUR
COUNT #	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
1:00-1:15	43	191	8	55	37	55	16	167	31	2	79	36	720	
1:15-1:30	48	188	9	57	34	51	19	171	30	3	75	38	723	
1:30-1:45	53	199	4	51	40	50	23	179	27	6	81	34	747	
1:45-2:00	59	211	7	49	43	52	29	185	22	4	77	31	769	2959
2:00-2:15	60	227	3	45	48	47	31	187	24	6	80	25	783	3022
2:15-2:30	63	239	5	49	53	50	36	195	27	5	74	24	820	3119
2:30-2:45	62	234	1	54	57	49	33	190	30	7	69	30	816	3188
2:45-3:00	67	228	2	50	54	54	30	182	33	11	62	33	806	3225
3:00-3:15	72	227	0	52	59	55	27	179	39	12	56	40	818	3260
3:15-3:30	66	239	5	49	57	56	35	209	41	13	59	44	873	3313
3:30-3:45	63	251	4	55	60	61	40	240	45	15	62	51	947	3444
3:45-4:00	60	261	8	52	64	60	44	282	57	20	69	53	1030	3668
movement total	716	2695	56	618	606	640	363	2366	406	104	843	439		
approach total		3467			1864			3135			1386		9852	

SAT PEAK HOUR PERIOD: 3:00 - 4:00 PM

SAT PEAK HOUR:

movement total	261	978	17	208	240	232	146	910	182	60	246	188		
approach total		1256			680			1238			494		3668	
approach PHF		0.95			0.97			0.81			0.87		0.89	

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY:
ALL VEHICLES

INTERSECTION: Ruggles & Parker Sts. PROJECT: Parcel 18 DEIR FILE: p18int8
DAY: Wednesday WEATHER: clear
TOWN/CITY: Boston DATE: October 12,1988 SURVEYOR: JB

STREET	Parker			Ruggles			Parker			Ruggles				
APPROACH	Northbound			Eastbound			Southbound			Westbound				
MOVEMENT	L	TH	R	L	TH	R	L	TH	R	L	TH	R	15 MIN	HOUR
COUNT #	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7:00-7:15	14	39	7	3	66	16	19	51	6	13	134	26	394	
7:15-7:30	22	50	9	2	115	14	31	54	7	16	153	22	495	
7:30-7:45	25	59	3	4	151	19	33	55	9	16	150	22	546	
7:45-8:00	29	57	7	9	164	34	35	55	8	13	140	15	566	2001
8:00-8:15	28	59	5	4	161	27	24	60	9	15	175	23	590	2197
8:15-8:30	31	59	7	2	120	14	25	43	9	6	155	32	503	2205
8:30-8:45	25	54	5	2	151	15	24	40	9	5	173	19	522	2181
8:45-9:00	15	37	13	1	121	24	23	38	8	10	171	15	476	2091
movement total	189	414	56	27	1049	163	214	396	65	94	1251	174		
approach total		659			1239			675			1519		4092	
4:00-4:15 PM	18	33	6	2	175	28	46	73	9	4	182	23	599	
4:15-4:30	19	27	5	3	172	31	44	79	8	6	184	21	599	
4:30-4:45	24	43	6	9	204	22	35	71	8	3	203	21	649	
4:45-5:00	30	53	8	7	171	28	30	63	8	8	201	20	627	2474
5:00-5:15	12	27	9	8	192	31	42	41	2	7	209	20	600	2475
5:15-5:30	22	38	6	4	188	21	42	59	7	12	220	30	649	2525
5:30-5:45	35	29	14	8	181	15	43	60	12	13	202	20	632	2508
5:45-6:00	25	34	6	5	172	28	33	60	5	11	203	22	604	2485
movement total	185	284	60	46	1455	204	315	506	59	64	1604	177		
approach total		529			1705			880			1845		4959	

AM PEAK HOUR PERIOD: 7:30 - 8:30 AM

PM PEAK HOUR PERIOD: 4:30 - 5:30 PM

AM PEAK HOUR:														
movement total	113	234	22	19	596	94	117	213	35	50	620	92		
approach total		369			709			365			762		2205	
approach PHF		0.95			0.86			0.93			0.89		0.93	

PM PEAK HOUR:														
movement total	88	161	29	28	755	102	149	234	25	30	833	91		
approach total		278			885			408			954		2525	
approach PHF		0.76			0.94			0.89			0.91		0.97	

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY:
ALL VEHICLES

INTERSECTION: Ruggles & Parker Sts. PROJECT: Parcel 18 DEIR FILE: int8sat
DAY: Saturday WEATHER:
TOWN/CITY: Boston DATE: October 15,1988 SURVEYOR:

STREET APPROACH	Parker Northbound			Ruggles Eastbound			Parker Southbound			Ruggles Westbound				
MOVEMENT	L	TH	R	L	TH	R	L	TH	R	L	TH	R	15 MIN	HOUR
COUNT #	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
1:00-1:15	11	24	5	2	99	9	18	38	3	5	115	20	349	
1:15-1:30	7	13	5	3	105	13	15	39	3	5	133	16	357	
1:30-1:45	15	27	3	3	83	6	24	48	1	5	125	27	367	
1:45-2:00	3	23	7	1	104	8	30	38	6	7	108	24	359	1432
2:00-2:15	12	19	8	3	85	9	15	32	2	5	108	25	323	1406
2:15-2:30	6	29	5	0	99	8	16	30	2	4	109	33	341	1390
2:30-2:45	7	29	4	1	78	8	28	29	3	3	104	18	312	1335
2:45-3:00	6	23	6	1	91	3	20	49	2	4	121	26	352	1328
3:00-3:15	14	25	9	1	117	14	29	39	3	6	109	19	385	1390
3:15-3:30	12	31	7	2	108	6	28	53	2	7	118	22	396	1445
3:30-3:45	8	25	10	2	128	8	48	57	5	5	126	28	450	1583
3:45-4:00	9	18	4	0	94	6	27	49	4	7	82	15	315	1546
movement total	110	286	73	19	1191	98	298	501	36	63	1358	273		
approach total		469			1308			835			1694		4306	

SAT PEAK HOUR PERIOD: 2:45 - 3:45 PM

SAT PEAK HOUR:

movement total	40	104	32	6	444	31	125	198	12	22	474	95		
approach total		176			481			335			591		1583	
approach PHF		0.88			0.87			0.76			0.93		0.88	

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY:
ALL VEHICLES

INTERSECTION: Melnea Cass, Columbus & Busway
TOWN/CITY: Boston

PROJECT: Parcel 18 DEIR
DAY: Thursday, Friday
DATE: October 27,28, 1989

FILE: p18int9
WEATHER: fair
SURVEYOR: We B

STREET	Busway			Columbus Ave.			Melnea Cass			Station Approach				
APPROACH	Northbound			Southbound			Westbound			Eastbound				
MOVEMENT	L	TH	R	L	TH	R	L	TH	R	L	TH	R	15 MIN	HOUR
COUNT #	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7:00-7:15	0	1	0	83	0	0	4	2	97	0	0	0	187	
7:15-7:30	0	2	0	60	1	0	2	4	121	0	1	2	193	
7:30-7:45	0	1	0	49	4	0	2	3	170	0	1	4	234	
7:45-8:00	0	1	0	67	2	0	3	3	176	0	1	4	257	871
8:00-8:15	0	0	0	62	1	0	10	7	174	1	4	5	264	948
8:15-8:30	0	0	0	74	1	0	7	3	160	0	1	6	252	1007
8:30-8:45	0	1	0	50	4	0	6	6	163	1	3	1	235	1008
8:45-9:00	0	3	0	58	2	1	3	2	167	0	0	5	241	992
movement total	0	9	0	503	15	1	37	30	1228	2	11	27		
approach total		9			519			1295			40		1863	
4:00-4:15 PM	0	1	0	174	8	0	2	5	45	1	2	8	246	
4:15-4:30	0	0	0	185	7	0	4	5	68	0	2	8	279	
4:30-4:45	0	0	0	180	12	0	5	5	79	0	2	7	290	
4:45-5:00	0	0	0	154	4	0	12	6	72	0	5	11	264	1079
5:00-5:15	0	1	0	151	6	0	8	4	70	0	3	10	253	1085
5:15-5:30	0	0	0	153	5	0	14	4	76	0	3	8	268	1075
5:30-5:45	0	0	0	145	12	0	7	5	81	0	3	17	270	1055
5:45-6:00	0	0	0	144	2	0	4	2	90	0	2	3	247	1038
movement total	0	2	0	1291	56	0	56	36	581	1	22	72		
approach total		2			1347			673			95		2117	

AM PEAK HOUR PERIOD: 7:45 - 8:45 AM

PM PEAK HOUR PERIOD: 4:15 - 5:15 PM

AM PEAK HOUR:														
movement total	0	2	0	253	8	0	26	19	673	2	9	16		
approach total		2			261			718			27		1008	
approach PHF		0.50			0.87			0.94			0.68		0.95	
PM PEAK HOUR:														
movement total	0	1	0	599	31	0	23	21	264	1	11	34		
approach total		1			724			308			46		1079	
approach PHF		0.25			0.94			0.94			0.72		0.93	

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY:
ALL VEHICLES

INTERSECTION: Melnea Cass, Columbus, & Busway
TOWN/CITY: Boston
PROJECT: Parcel 18 DEIR
DAY: Saturday
DATE: October 29,1988
FILE: int9sat
WEATHER: fair
SURVEYOR: Leo

STREET APPROACH	Busway Northbound			Columbus Southbound			Melnea Cass Westbound			Station Approach Eastbound				
MOVEMENT COUNT #	L 1	TH 2	R 3	L 4	TH 5	R 6	L 7	TH 8	R 9	L 10	TH 11	R 12	15 MIN TOTAL	HOUR TOTAL
1:00-1:15	0	0	0	44	12	0	2	0	66	0	1	10	135	
1:15-1:30	0	0	0	90	14	0	6	2	59	0	3	12	186	
1:30-1:45	0	1	0	98	12	0	5	0	63	0	3	14	196	
1:45-2:00	0	0	0	88	13	0	1	4	66	0	1	14	187	704
2:00-2:15	0	0	0	87	10	0	2	1	66	0	0	11	177	746
2:15-2:30	0	0	1	77	13	0	2	5	67	0	3	13	181	741
2:30-2:45	0	0	0	98	8	0	0	1	69	0	1	10	187	732
2:45-3:00	0	1	0	79	12	0	2	4	69	0	3	11	181	726
3:00-3:15	0	0	0	77	14	0	0	6	68	0	1	13	179	729
3:15-3:30	0	0	0	81	11	0	1	2	65	0	3	9	173	720
3:30-3:45	0	0	0	88	13	0	4	2	60	0	0	14	181	714
3:45-4:00	0	0	0	90	13	0	1	2	64	0	3	12	185	718
movement total	0	2	1	997	145	0	26	29	733	0	22	143		
approach total		3			1142			838			165		2148	

SAT PEAK HOUR PERIOD: 1:15 - 2:15 PM

SAT PEAK HOUR:

movement total	0	1	0	363	49	0	14	7	254	0	7	51		
approach total		1			412			275			58		746	
approach PHF		0.25			0.94			0.97			0.85		0.95	

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY
AUTOMOBILES

INTERSECTION: Washington St. and Melnea Cass Blvd.
TOWN/CITY: Boston (Roxbury)
PROJECT: Ruggles Center
DAY: Tuesday
DATE: 6/14/88
FILE: WMITMC
WEATHER: Fair
SURVEYOR: LS

STREET	Melnea Cass Blvd.			Melnea Cass Blvd.			Washington St.			Washington St.				
APPROACH	EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND				
MOVEMENT	L	TH	R	L	TH	R	L	TH	R	L	TH	R	15 MIN	HOUR
COUNT #	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7:00-7:15 AM	16	152	10	9	221	4	20	99	2	1	37	2	562	
7:15-7:30	16	141	7	7	213	6	18	76	5	0	30	10	531	
7:30-7:45	47	210	10	10	186	3	31	112	1	1	27	6	644	
7:45-8:00	32	180	5	5	210	9	18	121	1	1	30	4	617	2354
8:00-8:15	36	259	13	13	221	5	32	110	3	4	34	3	734	2526
8:15-8:30	29	198	3	7	199	3	19	92	4	2	27	6	579	2574
8:30-8:45	22	203	9	4	196	5	23	112	4	5	56	9	648	2578
8:45-9:00	36	176	6	6	201	1	21	86	10	1	32	6	584	2545
movement total	237	1511	63	61	1647	37	182	797	30	15	273	46		
approach total		1811			1745			1009			334		4899	
4:00-4:15 PM	31	259	14	6	181	7	26	63	9	11	91	26	732	
4:15-4:30	30	283	16	9	194	6	21	78	11	12	99	25	789	
4:30-4:45	36	350	24	12	192	6	26	105	5	9	79	18	863	
4:45-5:00	28	310	12	13	208	9	17	85	9	8	71	20	790	3174
5:00-5:15	34	313	14	10	226	3	11	81	6	6	114	32	856	3300
5:15-5:30	20	309	17	20	239	2	22	85	5	14	109	34	876	3392
5:30-5:45	24	279	19	19	211	3	19	77	8	14	66	29	768	3290
5:45-6:00	31	249	16	9	214	7	15	68	6	5	57	17	694	3193
movement total	234	2352	132	100	1665	45	157	642	57	81	675	212		
approach total		2732			1810			862			968		6372	

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY:
TRUCKS

INTERSECTION: Washington St. and Melnea Cass Blvd.
TOWN/CITY: Boston (Roxbury)

PROJECT: Ruggles Center
DAY: Tuesday
DATE: 5/14/88

FILE: WMCTMC
WEATHER: Fair
OBSERVER: LS

STREET APPROACH	Melnea Cass Blvd. EASTBOUND			Melnea Cass Blvd. WESTBOUND			Washington St. NORTHBOUND			Washington St. SOUTHBOUND				
MOVEMENT	L	TH	R	L	TH	R	L	TH	R	L	TH	R	15 MIN	HOUR
COUNT #	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7:00-7:15 AM	0	11	2	7	20	0	4	10	5	0	2	0	61	
7:15-7:30	4	5	0	6	10	0	2	9	5	0	3	1	50	
7:30-7:45	0	14	2	4	18	0	1	14	5	0	4	1	63	
7:45-8:00	5	12	5	7	6	0	0	13	6	0	3	0	57	231
8:00-8:15	1	10	1	6	12	0	4	13	4	1	6	0	58	233
8:15-8:30	1	15	2	4	15	1	3	11	2	0	5	0	59	247
8:30-8:45	1	17	2	4	15	1	3	10	2	0	5	0	60	244
8:45-9:00	1	15	2	6	13	1	2	14	1	0	4	0	54	246
movement total	13	99	16	44	114	3	19	104	30	1	37	2		
approach total		128			161			153			40		482	
4:00-4:15 PM	1	6	0	3	6	1	1	6	3	0	6	0	33	
4:15-4:30	1	9	0	6	8	1	3	12	4	1	6	0	51	
4:30-4:45	0	9	0	4	12	0	2	5	5	0	6	0	43	
4:45-5:00	2	7	1	4	6	0	2	4	5	0	2	0	33	160
5:00-5:15	0	6	0	3	1	0	2	7	4	0	2	0	25	152
5:15-5:30	0	4	0	3	4	0	4	4	4	1	4	0	28	129
5:30-5:45	0	0	1	2	4	0	3	3	1	0	1	0	15	101
5:45-6:00	0	5	0	6	1	0	2	5	2	0	5	0	26	94
movement total	4	46	2	31	42	2	19	46	28	2	32	0		
approach total		52			75			93			34		254	

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY
ALL VEHICLES

INTERSECTION: Washington St. and Melnea Cass Blvd.
TOWN/CITY: Boston (Roxbury)

PROJECT: Ruggles Center
DAY: Tuesday
DATE: 6/14/88

FILE: WMCTMC
WEATHER: Fair
SURVEYOR: LS

STREET	Melnea Cass Blvd. EASTBOUND			Melnea Cass Blvd. WESTBOUND			Washington St. NORTHBOUND			Washington St. SOUTHBOUND				
APPROACH														
MOVEMENT	L	TH	R	L	TH	R	L	TH	R	L	TH	R	15 MIN	HOUR
COUNT #	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7:00-7:15 AM	16	163	12	16	241	4	24	98	7	1	39	2	623	
7:15-7:30	22	148	7	13	223	6	20	85	10	0	38	11	581	
7:30-7:45	47	224	12	14	204	3	32	128	6	1	31	7	707	
7:45-8:00	38	192	10	12	216	9	18	139	7	1	33	4	679	2590
8:00-8:15	37	269	14	19	233	6	36	128	7	5	40	3	797	2764
8:15-8:30	30	203	5	11	214	4	22	103	6	2	32	6	638	2821
8:30-8:45	23	220	11	8	211	6	26	122	6	5	61	9	708	2822
8:45-9:00	37	193	8	12	219	2	23	100	11	1	36	6	648	2791
movement total	250	1610	79	105	1761	40	201	901	60	16	310	48		
approach total		1939			1906			1162			374		5381	
4:00-4:15 PM	32	265	14	11	187	8	27	75	12	11	97	26	765	
4:15-4:30	31	292	16	15	202	9	24	90	15	13	105	28	840	
4:30-4:45	38	359	24	16	204	6	28	110	10	9	76	26	908	
4:45-5:00	30	317	19	17	214	9	19	89	14	8	73	20	829	3340
5:00-5:15	34	305	14	13	227	3	13	88	10	8	116	32	893	3458
5:15-5:30	20	313	17	23	243	2	26	83	9	15	112	34	903	3521
5:30-5:45	24	279	20	21	215	3	22	80	7	14	67	29	781	3396
5:45-6:00	31	254	16	15	215	7	17	73	8	5	62	17	720	3287
movement total	240	2404	140	131	1707	47	176	694	85	83	708	212		
approach total		2784			1885			955			1003		6627	

AM PEAK HOUR PERIOD: 7:45 - 8:45 AM

PM PEAK HOUR PERIOD: 4:30 - 5:30 PM

AM PEAK HOUR:														
movement total	128	884	40	50	874	25	102	492	26	13	166	22		
approach total		1052			949			620			201		2822	
approach PHF		0.82			0.92			0.91			0.67		0.89	
percent trucks		6.6%			8.4%			13.2%			10.7%		9.0%	
PM PEAK HOUR:														
movement total	122	1314	74	69	888	20	86	376	43	40	377	112		
approach total		1510			977			505			529		3521	
approach PHF		0.90			0.91			0.85			0.82		0.97	
percent trucks		4.8%			6.5%			16.0%			4.0%		7.3%	

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY
AUTOMOBILES

INTERSECTION: Massachusetts Ave. and Melnea Cass Blvd.
TOWN/CITY: Boston (South End/Roxbury)
PROJECT: Ruggles Center
DAY: Monday
DATE: 6/13/88
FILE: MMCTMC
WEATHER: Fair
SURVEYOR: LC

STREET	Massachusetts Ave.			Southampton St.			Melnea Cass Blvd.			Southeast Expressway				
APPROACH	EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND				
MOVEMENT	L	TH	R	L	TH	R	L	TH	R	L	TH	R	15 MIN	HOUR
COUNT #	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7:00-7:15 AM	69	94	2	60	131	0	5	56	37	67	166	203	890	
7:15-7:30	59	91	0	62	155	1	6	69	37	72	159	200	911	
7:30-7:45	48	90	1	59	179	3	9	88	34	66	163	198	938	
7:45-8:00	76	88	1	81	182	4	2	95	52	51	150	205	987	3726
8:00-8:15	101	94	0	94	188	1	7	114	61	47	143	210	1060	3896
8:15-8:30	130	93	0	115	198	3	0	134	90	33	138	201	1135	4120
8:30-8:45	104	87	0	101	181	3	0	109	51	40	119	195	990	4172
8:45-9:00	61	87	0	81	153	1	1	79	35	38	123	190	849	4034
movement total	648	724	4	653	1367	16	30	744	397	414	1161	1602		
approach total		1376			2036			1171			3177		7760	
4:00-4:15 PM	152	129	0	68	90	0	6	153	91	46	173	47	955	
4:15-4:30	145	120	0	65	95	1	4	139	88	37	170	69	933	
4:30-4:45	138	70	0	82	106	0	2	141	79	39	176	62	895	
4:45-5:00	155	77	1	86	111	3	3	132	84	43	190	126	1011	3794
5:00-5:15	174	66	0	102	96	3	7	151	84	29	207	170	1089	3928
5:15-5:30	160	61	0	89	91	1	4	130	66	28	181	149	960	3955
5:30-5:45	179	121	0	41	68	3	3	146	91	42	162	135	991	4051
5:45-6:00	158	118	0	54	73	1	2	120	76	29	151	122	904	3944
movement total	1261	762	1	587	730	12	31	1112	659	293	1410	880		
approach total		2024			1329			1802			2583		7738	

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY:
TRUCKS

INTERSECTION: Massachusetts Ave. and Melnea Cass Blvd.
TOWN/CITY: Boston (South End/Roxbury)

PROJECT: Ruggles Center
DAY: Monday
DATE: 6/13/88

FILE: MMCTMC
WEATHER: Fair
SURVEYOR: LC

STREET	Massachusetts Ave.			Southampton St.			Melnea Cass Blvd.			Southeast Expressway				
APPROACH	EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND				
MOVEMENT	L	TH	R	L	TH	R	L	TH	R	L	TH	R	15 MIN	HOUR
COUNT #	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7:00-7:15 AM	0	10	0	9	22	1	0	11	7	15	5	8	88	
7:15-7:30	0	9	0	7	23	0	0	9	11	17	4	7	87	
7:30-7:45	0	10	1	7	26	0	0	16	13	15	9	5	102	
7:45-8:00	0	9	0	4	27	1	0	15	11	20	19	7	113	390
8:00-8:15	0	6	0	2	20	0	0	15	9	19	18	6	95	397
8:15-8:30	1	4	0	4	25	1	1	12	13	21	16	8	106	416
8:30-8:45	0	4	0	3	22	0	1	12	7	11	18	5	83	397
8:45-9:00	0	2	1	4	24	0	0	9	10	14	9	5	78	362
movement total	1	54	2	40	189	3	2	99	81	132	98	51		
approach total		57			232			182			281		752	
4:00-4:15 PM	7	3	0	3	11	1	2	6	5	19	8	2	67	
4:15-4:30	6	3	0	8	9	0	0	5	5	31	9	0	76	
4:30-4:45	4	5	1	6	9	0	0	2	4	17	3	4	55	
4:45-5:00	2	8	1	5	10	4	1	3	2	12	5	7	60	258
5:00-5:15	3	8	0	0	6	0	0	0	4	14	3	6	44	235
5:15-5:30	2	7	0	0	2	0	0	0	4	6	1	3	25	184
5:30-5:45	1	4	0	0	1	0	0	0	2	7	0	1	16	145
5:45-6:00	2	1	0	0	1	0	0	0	3	3	0	0	10	95
movement total	27	39	2	22	49	5	3	16	29	109	29	23		
approach total		68			76			48			161		353	

HOWARD/STEIN-HUDSON ASSOCIATES
38 Chauncy Street
Boston, MA 02111

VEHICLE TURNING MOVEMENT COUNT SUMMARY:
ALL VEHICLES

INTERSECTION: Massachusetts Ave. and Melnea Cass Blvd.
TOWN/CITY: Boston (South End/Roxbury)
PROJECT: Ruggles Center
DAY: Monday
DATE: 6/13/88
FILE: MMCTMC
WEATHER: Fair
SURVEYOR: LC

STREET	Massachusetts Ave.			Southampton St.			Melnea Cass Blvd.			Southeast Expressway				
APPROACH	EASTBOUND			WESTBOUND			NORTHBOUND			SOUTHBOUND				
MOVEMENT	L	TH	R	L	TH	R	L	TH	R	L	TH	R	15 MIN	HOUR
COUNT #	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL	TOTAL
7:00-7:15 AM	69	104	2	69	153	1	5	67	44	82	171	211	978	
7:15-7:30	59	100	0	69	178	1	6	78	48	89	163	207	998	
7:30-7:45	48	100	2	66	205	3	9	104	47	81	172	203	1040	
7:45-8:00	76	97	1	85	209	5	2	110	63	71	169	212	1100	411
8:00-8:15	101	100	0	96	208	1	7	129	70	66	161	216	1155	429
8:15-8:30	131	97	0	119	223	4	1	146	103	54	154	209	1241	453
8:30-8:45	104	91	0	104	203	3	1	121	58	51	137	200	1073	456
8:45-9:00	61	89	1	85	177	1	1	88	45	52	132	195	927	439
movement total	649	778	6	693	1556	19	32	843	478	546	1259	1653		
approach total		1433			2268			1353			3458		8512	
4:00-4:15 PM	159	132	0	71	101	1	8	159	96	65	181	49	1022	
4:15-4:30	151	123	0	73	104	1	4	144	93	68	179	69	1009	
4:30-4:45	142	75	1	88	115	0	2	143	83	56	179	66	950	
4:45-5:00	157	85	2	91	121	7	4	135	86	55	195	133	1071	405
5:00-5:15	177	74	0	102	102	3	7	151	68	43	210	176	1133	416
5:15-5:30	161	68	0	89	93	1	4	130	70	34	182	152	985	413
5:30-5:45	180	125	0	41	69	3	3	146	93	49	162	136	1007	419
5:45-6:00	160	119	0	54	74	1	2	120	79	32	151	122	914	403
movement total	1288	801	3	609	779	17	34	1128	688	402	1439	903		
approach total		2092			1405			1850			2744		8091	

AM PEAK HOUR PERIOD: 7:45 - 8:45 AM

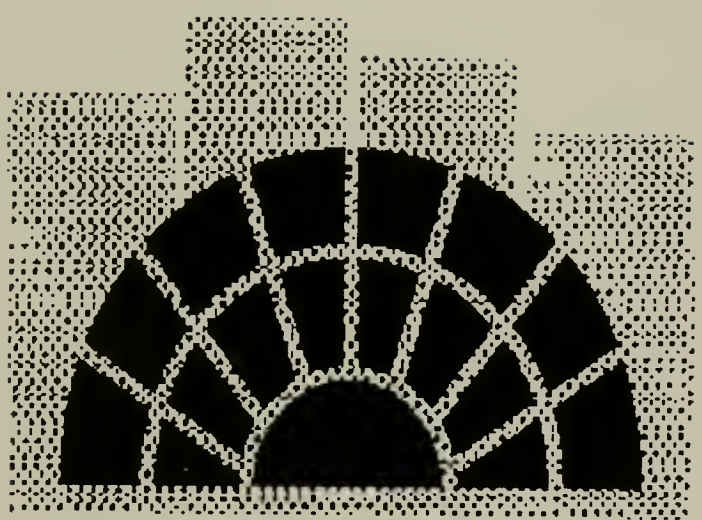
PM PEAK HOUR PERIOD: 4:45 - 5:45 PM

AM PEAK HOUR:

movement total	412	385	1	404	843	13	11	506	294	242	621	837		
approach total		798			1260			811			1700		4569	
approach PHF		0.88			0.91			0.81			0.94		0.92	
percent trucks		4.0%			10.2%			13.5%			8.1%		8.8%	

PM PEAK HOUR:

movement total	676	352	2	323	395	14	18	562	337	181	749	537		
approach total		1030			722			917			1527		4196	
approach PHF		0.84			0.82			0.93			0.89		0.93	
percent trucks		2.7%			16.5%			9.8%			10.2%		9.3%	



Appendix F

Level of Service Calculation

APPENDIX F

LEVEL OF SERVICE CALCULATIONS

- Existing (1988) Conditions
- No Build (1996) Conditions
- No Build (1996) Conditions with No Build Improvements
- Master Plan Design (1996) Conditions
- Master Plan Design (1996) Conditions with Build Mitigation

Level of Service Calculations:

Existing (1988) Conditions
(AM, PM and SAT peak hours)

- Tremont/Ruggles/Whittier
- Tremont/Melnea Cass
- Ruggles/Busway
- Tremont/Prentiss
- Huntington/Ruggles
- Tremont/Columbus/New Dudley
- Parker/Ruggles
- Melnea Cass/Columbus/Busway
- Melnea Cass/Washington
- Melnea Cass/Massachusetts/Southampton/
  Expressway Ramps

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/RUGGLES/WHITTIER
EXISTING CONDITIONS - AM PEAK HOUR
date:08-15-1989 time:10:00:56
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I1AM GEOMETRICS=P18I1M SIGNAL=P18I1M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	621	0	272	2	0	1	11.0	0.0	15.0	50
WB	35	32	21	0	1	0	0.0	10.0	0.0	24
NB	423	1323	0	1	3	0	11.0	11.0	0.0	42
SB	0	795	798	0	2	1	0.0	11.0	15.0	42

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	-2.0%	2.0%	N	0	0	.960	50	N	16.5	3
WB	0.0%	0.0%	Y	0	0	.960	50	N	16.5	3
NB	0.0%	2.0%	N	0	0	.960	50	N	14.5	3
SB	0.0%	2.0%	N	0	0	.960	100	N	14.5	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*						*	23.6	0	A
2				*				*	*	*				*	*		36.4	3	A
3	*		*					*				*			*		24.5	0	A
4	*		*		*	*	*					*				*	9.6	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	621	0	272	.960	647	0	283
WB	35	32	21	.960	36	33	22
NB	423	1323	0	.960	441	1378	0
SB	0	795	798	.960	0	828	831

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	647	2	1.05	679	1.00	0.00
EB	RT	283	1	1.00	283	0.00	1.00
WB	LT-TH-RT	92	1	1.00	92	0.40	0.24
NB	LT	441	1	1.00	441	1.00	0.00
NB	TH	1378	3	1.10	1516	0.00	0.00
SB	TH	828	2	1.05	870	0.00	0.00
SB	RT	831	1	1.00	831	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	36	33	22	100	100	100	0	1	0	55
WESTBOUND	647	0	283	0	0	0	2	0	1	0
NORTHBOUND	0	828	831	100	100	0	0	2	1	828

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	2	0.967	0.990	1.010	1.000	1.000	1.000	1.000	0.920	3202
EB	RT	1800	1	1.100	0.990	1.010	1.000	1.000	1.000	0.836	1.000	1655
WB	LT-TH-RT	1800	1	0.933	1.000	1.000	1.000	1.000	1.000	0.856	0.837	1204

```
NB  LT        1800  1 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.950 1637
NB  TH        1800  3 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 5168
SB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3446
SB  RT        1800  1 1.100 0.990 1.000 1.000 1.000 1.000 0.836 1.000 1638

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT        679 3202 0.17 0.25  932 0.69
EB  RT        283 1655 0.17 0.58  954 0.30
WB  LT-TH-RT   92 1204 0.08 0.10  115 0.79     *
NB  LT        441 1637 0.19 0.24  549 0.80     *
NB  TH       1516 5168 0.29 0.60 3097 0.49
SB  TH        870 3446 0.25 0.36 1253 0.69
SB  RT        831 1638 0.51 0.61  997 0.83     *

CYCLE=100.0  LOST= 3.0  SUM V/S CRIT= 0.77 TOTAL V/C= 0.80
FOR THE EASTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 70 LEFT TURNS ON THE CHANGE INTERVAL AND  78 ON THE PERMISSIVE PHASE
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  95 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1     c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT        0.69 0.34 100.0  21.63  932    1.57 1.00   23.20  C  13.6   14
EB  RT        0.30 0.58 100.0   8.23  954    0.05 0.85    7.04  B   3.3    3
WB  LT-TH-RT  0.79 0.10 100.0  33.63  115   20.18 0.85   45.74  E   2.3    4
NB  LT        0.80 0.60 100.0  11.76  549    5.80 1.00   17.56  C   9.4    9
NB  TH        0.49 0.60 100.0   8.64 3097    0.10 0.85    7.43  B  15.3   15
SB  TH        0.69 0.36 100.0  20.59 1253    1.18 0.85   18.50  C  14.6   15
SB  RT        0.83 0.61 100.0  11.82  997    4.36 0.85   13.75  B   9.0   10

DIR Delay LOS
EB  18.44  C
WB  45.74  E
NB   9.71  B
SB  16.18  C
INTERSECTION DELAY = 14.53 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  16.0 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  23.7 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  36.3 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  24.4 secs green,   0.0 secs yellow + red clear
suggested timing phase 4 is   9.6 secs green,   3.0 secs yellow + red clear
```

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/RUGGLES/WHITTIER
EXISTING CONDITIONS - PM PEAK HOUR
date:08-15-1989 time:10:05:03
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I1PM GEOMETRICS=P18I1M SIGNAL=P18I1M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	806	0	305	2	0	1	11.0	0.0	15.0	50
WB	35	18	23	0	1	0	0.0	10.0	0.0	24
NB	327	1047	0	1	3	0	11.0	11.0	0.0	42
SB	0	1208	928	0	2	1	0.0	11.0	15.0	42

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT MIN TIME	TYPE
EB	-2.0%	2.0%	N	0	0	.940	50	N 16.5	3
WB	0.0%	2.0%	Y	0	0	.940	50	N 16.5	3
NB	0.0%	4.0%	N	0	0	.940	50	N 14.5	3
SB	0.0%	2.0%	N	0	0	.940	100	N 14.5	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*						*	18.5	0	A
2				*				*	*	*				*	*		42.8	3	A
3	*		*					*				*			*		25.1	0	A
4	*		*		*	*	*					*				*	7.6	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	806	0	305	.940	857	0	324
WB	35	18	23	.940	37	19	24
NB	327	1047	0	.940	348	1114	0
SB	0	1208	928	.940	0	1285	987

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	857	2	1.05	900	1.00	0.00
EB	RT	324	1	1.00	324	0.00	1.00
WB	LT-TH-RT	81	1	1.00	81	0.46	0.30
NB	LT	348	1	1.00	348	1.00	0.00
NB	TH	1114	3	1.10	1225	0.00	0.00
SB	TH	1285	2	1.05	1349	0.00	0.00
SB	RT	987	1	1.00	987	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	37	19	24	100	100	100	0	1	0	44
WESTBOUND	857	0	324	0	0	0	2	0	1	0
NORTHBOUND	0	1285	987	100	100	0	0	2	1	1285

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	2	0.967	0.990	1.010	1.000	1.000	1.000	1.000	0.920	3202
EB	RT	1800	1	1.100	0.990	1.010	1.000	1.000	1.000	0.835	1.000	1653
WB	LT-TH-RT	1800	1	0.933	0.990	1.000	1.000	1.000	1.000	0.845	0.827	1162

```
NB  LT        1800  1 0.967 0.980 1.000 1.000 1.000 1.000 1.000 0.950 1621
NB  TH        1800  3 0.967 0.980 1.000 1.000 1.000 1.000 1.000 1.000 5118
SB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3446
SB  RT        1800  1 1.100 0.990 1.000 1.000 1.000 1.000 0.835 1.000 1637

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT        900 3202 0.23 0.25  934 0.92     *
EB  RT        324 1653 0.20 0.51  847 0.38
WB  LT-TH-RT   81 1162 0.07 0.08   88 0.92     *
NB  LT        348 1621 0.17 0.18  380 0.92     *
NB  TH       1225 5118 0.24 0.61 3135 0.39
SB  TH       1349 3446 0.39 0.43 1474 0.92     *
SB  RT        987 1637 0.60 0.68 1112 0.89

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.86 TOTAL V/C= 0.92
FOR THE EASTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 70 LEFT TURNS ON THE CHANGE INTERVAL AND  60 ON THE PERMISSIVE PHASE
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 68 LEFT TURNS ON THE CHANGE INTERVAL AND  18 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1     c      d2    PF   Delay LOS Avg Q  95% Q
EB  LT       0.92 0.33 100.0  24.58  934    9.87 1.00   34.45  D  17.8   26
EB  RT       0.38 0.51 100.0  11.25  847    0.15 0.85    9.69  B   4.4    4
WB  LT-TH-RT 0.92 0.08 100.0  34.87   88   48.06 0.85   70.49  F   2.6    6
NB  LT       0.92 0.61 100.0  12.99  380   18.79 1.00   31.78  D   7.9   10
NB  TH       0.39 0.61 100.0   7.50 3135    0.04 0.85    6.41  B  12.0   12
SB  TH       0.92 0.43 100.0  20.45 1474    6.70 0.85   23.08  C  20.4   26
SB  RT       0.89 0.68 100.0   9.86 1112    6.44 0.85   13.85  B   8.8   12

DIR Delay LOS
EB  27.89  D
WB  70.49  F
NB  12.02  B
SB  19.18  C
INTERSECTION DELAY = 19.86 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  64.2 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  18.5 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  42.7 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  25.2 secs green,   0.0 secs yellow + red clear
suggested timing phase 4 is   7.6 secs green,   3.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/RUGGLES/WHITTIER
EXISTING CONDITIONS - SAT PEAK HOUR
date:08-15-1989 time:10:08:32
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I1SAT GEOMETRICS=P18I1M SIGNAL=P18I1M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	550	0	255	2	0	1	11.0	0.0	15.0	50
WB	14	12	5	0	1	0	0.0	10.0	0.0	24
NB	257	952	0	1	3	0	11.0	11.0	0.0	42
SB	0	1054	354	0	2	1	0.0	11.0	15.0	42

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT MIN TIME	TYPE
EB	-2.0%	2.0%	N	0	0	.920	50	N 16.5	3
WB	0.0%	0.0%	Y	2	0	.920	50	N 16.5	3
NB	0.0%	2.0%	N	0	0	.920	50	N 14.5	3
SB	0.0%	2.0%	N	0	0	.920	50	N 14.5	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*						*	16.3	0	A
2				*				*	*	*				*	*		50.0	3	A
3	*		*					*				*			*		23.2	0	A
4	*		*		*	*	*					*				*	4.5	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	550	0	255	.920	598	0	277
WB	14	12	5	.920	15	13	5
NB	257	952	0	.920	279	1035	0
SB	0	1054	354	.920	0	1146	385

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	598	2	1.05	628	1.00	0.00
EB	RT	277	1	1.00	277	0.00	1.00
WB	LT-TH-RT	34	1	1.00	34	0.45	0.16
NB	LT	279	1	1.00	279	1.00	0.00
NB	TH	1035	3	1.10	1138	0.00	0.00
SB	TH	1146	2	1.05	1203	0.00	0.00
SB	RT	385	1	1.00	385	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	15	13	5	100	100	100	0	1	0	18
WESTBOUND	598	0	277	0	0	0	2	0	1	0
NORTHBOUND	0	1146	385	100	100	0	0	2	1	1146

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	2	0.967	0.990	1.010	1.000	1.000	1.000	1.000	0.920	3202
EB	RT	1800	1	1.100	0.990	1.010	1.000	1.000	1.000	0.835	1.000	1653
WB	LT-TH-RT	1800	1	0.933	1.000	1.000	0.890	1.000	1.000	0.874	0.828	1083

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NB  LT        1800  1 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.950 1637
NB  TH        1800  3 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 5168
SB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3446
SB  RT        1800  1 1.100 0.990 1.000 1.000 1.000 1.000 0.834 1.000 1634

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT        628 3202 0.16 0.23  854 0.70     *
EB  RT        277 1653 0.17 0.44  727 0.38
WB  LT-TH-RT   34 1083 0.03 0.04   48 0.70     *
NB  LT        279 1637 0.11 0.16  401 0.70     *
NB  TH       1138 5168 0.22 0.66 3430 0.33
SB  TH       1203 3446 0.35 0.50 1723 0.70     *
SB  RT        385 1634 0.24 0.73 1196 0.32

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.66 TOTAL V/C= 0.70
FOR THE EASTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 70 LEFT TURNS ON THE CHANGE INTERVAL AND  43 ON THE PERMISSIVE PHASE
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  65 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1     c       d2    PF   Delay LOS Avg Q  95% Q
EB  LT       0.70 0.28 100.0  24.67  854     1.79 1.00   26.45  D  12.8    14
EB  RT       0.38 0.44 100.0  14.33  727     0.17 0.85   12.32  B   4.3     4
WB  LT-TH-RT 0.70 0.04 100.0  35.80   48    22.42 0.85   49.48  E   0.9     2
NB  LT       0.70 0.66 100.0   7.99  401     3.57 1.00   11.56  B   6.5     6
NB  TH       0.33 0.66 100.0   5.51 3430     0.02 0.85    4.71  A   9.7    10
SB  TH       0.70 0.50 100.0  14.59 1723     0.89 0.85   13.15  B  15.9    16
SB  RT       0.32 0.73 100.0   3.57 1196     0.06 0.85    3.08  A   2.9     3

DIR Delay LOS
EB  22.13  C
WB  49.48  E
NB   6.06  B
SB  10.71  B
INTERSECTION DELAY = 11.99 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  19.4 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  16.3 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  50.0 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  23.2 secs green,   0.0 secs yellow + red clear
suggested timing phase 4 is   4.5 secs green,   3.0 secs yellow + red clear
```

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
EXISTING CONDITIONS - AM PEAK HOUR
date:08-15-1989 time:08:44:05
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I2AM GEOMETRICS=P18INT2 SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	4	64	225	0	1	1	0.0	11.0	11.0	44
WB	0	1280	60	0	3	0	0.0	11.0	0.0	49
NB	516	817	0	0	2	0	0.0	13.0	0.0	56
SB	55	441	1	0	2	0	0.0	14.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	50	N	16.3	3
WB	0.0%	2.0%	N	0	0	.950	50	N	16.3	3
NB	0.0%	2.0%	N	0	0	.950	50	N	15.0	3
SB	0.0%	2.0%	N	0	0	.950	50	N	15.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							12.1	0	A
2				*				*	*	*			*	*	*		40.7	3	A
3						*	*					*				*	33.1	3	A
4	*	*	*									*				*	5.1	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	4	64	225	.950	4	67	237
WB	0	1280	60	.950	0	1347	63
NB	516	817	0	.950	543	860	0
SB	55	441	1	.950	58	464	1

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	72	1	1.00	72	0.06	0.00
EB	RT	237	1	1.00	237	0.00	1.00
WB	TH-RT	1411	3	1.10	1552	0.00	0.04
NB	LT-TH	1403	2	1.05	1473	0.39	0.00
SB	LT-TH-RT	523	2	1.05	549	0.11	0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	1347	63	0	0	0	0	3	0	0
NORTHBOUND	58	464	1	100	100	100	0	2	0	523
SOUTHBOUND	543	860	0	77	77	0	0	2	0	1082

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.891	1534
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.843	1.000	1452
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.992	1.000	5128
NB	LT-TH	1800	2	1.033	0.990	1.000	1.000	1.000	1.000	1.000	0.830	3059
SB	LT-TH-RT	1800	2	1.067	0.990	1.000	1.000	1.000	1.000	1.000	0.549	2087

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
SB	100	41	2	523	523	58	0.11	2	1082	0.39

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
SB	2558	0.423	0.000	0.199	1.000	40.689	0.000	0.000	5.665	0.098	0.549

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH	72	1534	0.05	0.05	78	0.91	*
EB	RT	237	1452	0.16	0.17	249	0.95	
WB	TH-RT	1552	5128	0.30	0.33	1699	0.91	*
NB	LT-TH	1473	3059	0.48	0.53	1614	0.91	*
SB	LT-TH-RT	549	2087	0.26	0.41	849	0.65	

CYCLE=100.0 LOST= 9.0 SUM V/S CRIT= 0.83 TOTAL V/C= 0.91

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH	0.91	0.05	100.0	35.89	78	50.98	0.85	73.84	F	2.4	5
EB	RT	0.95	0.17	100.0	31.15	249	31.45	0.85	53.21	E	6.2	11
WB	TH-RT	0.91	0.33	100.0	24.36	1699	5.79	0.85	25.63	D	26.2	31
NB	LT-TH	0.91	0.53	100.0	16.37	1614	6.05	0.85	19.05	C	18.4	23
SB	LT-TH-RT	0.65	0.41	100.0	18.14	849	1.22	0.85	16.46	C	8.6	9

DIR	Delay	LOS
EB	57.99	E
WB	25.63	D
NB	19.05	C
SB	16.46	C

INTERSECTION DELAY = 24.41 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 71.8 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 12.0 secs green, 0.0 secs yellow + red clear
suggested timing phase 2 is 40.8 secs green, 3.0 secs yellow + red clear
suggested timing phase 3 is 33.1 secs green, 3.0 secs yellow + red clear
suggested timing phase 4 is 5.1 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
EXISTING CONDITIONS - PM PEAK HOUR
date:08-15-1989 time:08:49:09
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I2PM GEOMETRICS=P18INT2 SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	220	498	0	1	1	0.0	11.0	11.0	44
WB	0	1399	45	0	3	0	0.0	11.0	0.0	49
NB	352	607	0	0	2	0	0.0	13.0	0.0	56
SB	72	541	15	0	2	0	0.0	14.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.930	50	N	16.3	3
WB	0.0%	2.0%	N	0	0	.930	50	N	16.3	3
NB	0.0%	2.0%	N	0	0	.930	50	N	15.0	3
SB	0.0%	2.0%	N	0	0	.930	50	N	15.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							9.2	0	A
2				*				*	*	*			*	*	*		29.9	3	A
3						*	*					*				*	30.2	3	A
4	*	*	*									*				*	21.7	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	220	498	.930	0	237	535
WB	0	1399	45	.930	0	1504	48
NB	352	607	0	.930	378	653	0
SB	72	541	15	.930	77	582	16

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	237	1	1.00	237	0.00	0.00
EB	RT	535	1	1.00	535	0.00	1.00
WB	TH-RT	1553	3	1.10	1708	0.00	0.03
NB	LT-TH	1031	2	1.05	1083	0.37	0.00
SB	LT-TH-RT	675	2	1.05	709	0.11	0.02

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
NORTHBOUND	77	582	16	100	100	100	0	2	0	675
SOUTHBOUND	378	653	0	76	76	0	0	2	0	789

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	1.000	1723
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.833	1.000	1436
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.995	1.000	5140
NB	LT-TH	1800	2	1.033	0.990	1.000	1.000	1.000	1.000	1.000	0.789	2905
SB	LT-TH-RT	1800	2	1.067	0.990	1.000	1.000	1.000	1.000	0.996	0.567	2148

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
SB	100	30	2	675	675	77	0.11	2	789	0.37

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
SB	2331	0.338	0.000	0.382	0.877	29.926	0.123	0.280	2.944	0.135	0.567

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	237	1723	0.14	0.22	374	0.63	
EB	RT	535	1436	0.37	0.31	443	1.21	*
WB	TH-RT	1708	5140	0.33	0.30	1552	1.10	*
NB	LT-TH	1083	2905	0.37	0.39	1137	0.95	
SB	LT-TH-RT	709	2148	0.33	0.30	643	1.10	*

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 1.04 TOTAL V/C= 1.10

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.63	0.22	100.0	27.02	374	2.45	0.85	25.05	D	5.1	6
EB	RT	1.21	0.31	100.0	28.95	443	126.68	0.85	132.28	F	24.8	60
WB	TH-RT	1.10	0.30	100.0	27.74	1552	51.84	0.85	67.64	F	44.2	88
NB	LT-TH	0.95	0.39	100.0	22.44	1137	12.17	0.85	29.42	D	17.4	26
SB	LT-TH-RT	1.10	0.30	100.0	27.85	643	62.67	0.85	76.95	F	21.0	44

DIR	Delay	LOS
EB	99.43	F
WB	67.64	F
NB	29.42	D
SB	76.95	F

INTERSECTION DELAY = 65.24 INTERSECTION LOS=F

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
for chosen cycle length 100.0
suggested timing phase 1 is 9.2 secs green, 0.0 secs yellow + red clear
suggested timing phase 2 is 30.0 secs green, 3.0 secs yellow + red clear
suggested timing phase 3 is 30.2 secs green, 3.0 secs yellow + red clear
suggested timing phase 4 is 21.7 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
EXISTING CONDITIONS - SAT PEAK HOUR
date:08-15-1989 time:08:52:39
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I2SAT GEOMETRICS=P18INT2 SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	6	68	311	0	1	1	0.0	11.0	11.0	44
WB	0	812	104	0	3	0	0.0	11.0	0.0	49
NB	250	779	0	0	2	0	0.0	13.0	0.0	56
SB	81	510	25	0	2	0	0.0	14.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	25	N	16.3	3
WB	0.0%	2.0%	N	0	0	.950	25	N	16.3	3
NB	0.0%	2.0%	N	0	0	.950	25	N	15.0	3
SB	0.0%	2.0%	N	0	0	.950	25	N	15.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							9.6	0	A
2				*				*	*	*			*	*	*		38.6	3	A
3						*	*					*				*	26.7	3	A
4	*	*	*									*				*	16.1	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	6	68	311	.950	6	72	327
WB	0	812	104	.950	0	855	109
NB	250	779	0	.950	263	820	0
SB	81	510	25	.950	85	537	26

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	78	1	1.00	78	0.08	0.00
EB	RT	327	1	1.00	327	0.00	1.00
WB	TH-RT	964	3	1.10	1061	0.00	0.11
NB	LT-TH	1083	2	1.05	1137	0.24	0.00
SB	LT-TH-RT	648	2	1.05	681	0.13	0.04

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	855	109	0	0	0	0	3	0	0
NORTHBOUND	85	537	26	100	100	100	0	2	0	648
SOUTHBOUND	263	820	0	80	80	0	0	2	0	867

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.888	1530
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.843	1.000	1452
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.982	1.000	5073
NB	LT-TH	1800	2	1.033	0.990	1.000	1.000	1.000	1.000	1.000	0.857	3156
SB	LT-TH-RT	1800	2	1.067	0.990	1.000	1.000	1.000	1.000	0.993	0.595	2248

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
SB	100	39	2	648	648	85	0.13	2	867	0.24

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
SB	2689	0.322	9.345	0.333	0.797	29.218	0.203	0.508	3.375	0.190	0.595

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH	78	1530	0.05	0.16	247	0.32	
EB	RT	327	1452	0.23	0.26	374	0.88	*
WB	TH-RT	1061	5073	0.21	0.27	1353	0.78	*
NB	LT-TH	1137	3156	0.36	0.48	1521	0.75	
SB	LT-TH-RT	681	2248	0.30	0.39	867	0.79	*

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.74 TOTAL V/C= 0.78

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH	0.32	0.16	100.0	28.16	247	0.25	0.85	24.15	C	1.8	2
EB	RT	0.88	0.26	100.0	27.04	374	13.98	0.85	34.86	D	6.8	10
WB	TH-RT	0.78	0.27	100.0	25.84	1353	2.18	0.85	23.81	C	19.6	20
NB	LT-TH	0.75	0.48	100.0	15.94	1521	1.46	0.85	14.79	B	15.6	16
SB	LT-TH-RT	0.79	0.39	100.0	20.58	867	3.36	0.85	20.35	C	11.1	12

DIR	Delay	LOS
EB	32.80	D
WB	23.81	C
NB	14.79	B
SB	20.35	C

INTERSECTION DELAY = 21.08 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 26.8 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 9.6 secs green, 0.0 secs yellow + red clear
suggested timing phase 2 is 38.6 secs green, 3.0 secs yellow + red clear
suggested timing phase 3 is 26.6 secs green, 3.0 secs yellow + red clear
suggested timing phase 4 is 16.1 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
RUGGLES STREET/BUSWAY (OUTBOUND)
EXISTING CONDITIONS: AM PEAK HOUR
date:12-22-1988 time:16:31:19
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I4AM GEOMETRICS=P18INT4 SIGNAL=P18INT4
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	805	0	0	2	0	0.0	12.0	0.0	50
WB	0	994	0	0	2	0	0.0	12.0	0.0	50
NB	0	0	0	0	0	0	0.0	0.0	0.0	0
SB	101	0	24	0	1	0	0.0	15.0	0.0	36

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.860	50	N	16.5	3
WB	0.0%	2.0%	N	0	0	.860	50	N	16.5	3
NB	0.0%	0.0%	N	0	0	.000	0	N	13.0	0
SB	2.0%	%100.0%	N	0	0	.860	50	N	13.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*				*	*									*	36.3	3	A
2				*				*						*		*	17.7	3	A

CYCLE= 60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	805	0	.860	0	936	0
WB	0	994	0	.860	0	1156	0
NB	0	0	0	.000	0	0	0
SB	101	0	24	.860	117	0	28

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	936	2	1.05	983	0.00	0.00
WB	TH	1156	2	1.05	1214	0.00	0.00
SB	LT-RT	145	1	1.00	145	0.81	0.19

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
SOUTHBOUND	0	0	0	0	0	0	0	0	0	0

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3564
WB	TH	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3564
SB	LT-RT	1800	1	1.100	0.667	0.990	1.000	1.000	1.000	0.870	0.772	877

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	983	3564	0.28	0.61	2158	0.46	
WB	TH	1214	3564	0.34	0.61	2158	0.56	*
SB	LT-RT	145	877	0.17	0.29	258	0.56	*

CYCLE= 60.0 LOST= 6.0 SUM V/S CRIT= 0.51 TOTAL V/C= 0.56

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.46	0.61	60.0	4.90	2158	0.11	0.85	4.26	A	6.2	6
WB	TH	0.56	0.61	60.0	5.39	2158	0.26	0.85	4.80	A	7.6	8
SB	LT-RT	0.56	0.29	60.0	13.60	258	2.09	1.00	15.68	C	1.7	3

DIR	Delay	LOS
EB	4.26	A
WB	4.80	A
SB	15.68	C

INTERSECTION DELAY = 5.25 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 60 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 12.8 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
RUGGLES STREET/BUSWAY (OUTBOUND)
EXISTING CONDITIONS: PM PEAK HOUR
date:12-22-1988 time:15:44:43
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I4PM GEOMETRICS=P18INT4 SIGNAL=P18INT4
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	950	0	0	2	0	0.0	12.0	0.0	50
WB	0	1109	0	0	2	0	0.0	12.0	0.0	50
NB	0	0	0	0	0	0	0.0	0.0	0.0	0
SB	78	0	13	0	1	0	0.0	15.0	0.0	36

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.970	50	N	16.5	3
WB	0.0%	2.0%	N	0	0	.970	50	N	16.5	3
NB	0.0%	0.0%	N	0	0	.860	0	N	13.0	3
SB	2.0%	%100.0%	N	0	0	.860	50	N	13.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*			*	*										*	39.7	3	A
2			*				*						*		*		14.3	3	A

CYCLE= 60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	950	0	.970	0	979	0
WB	0	1109	0	.970	0	1143	0
NB	0	0	0	.860	0	0	0
SB	78	0	13	.860	91	0	15

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	979	2	1.05	1028	0.00	0.00
WB	TH	1143	2	1.05	1200	0.00	0.00
SB	LT-RT	106	1	1.00	106	0.86	0.14

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
SOUTHBOUND	0	0	0	0	0	0	0	0	0	0

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3564
WB	TH	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3564
SB	LT-RT	1800	1	1.100	0.667	0.990	1.000	1.000	1.000	0.877	0.764	876

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	1028	3564	0.29	0.66	2361	0.44	
WB	TH	1200	3564	0.34	0.66	2361	0.51	*
SB	LT-RT	106	876	0.12	0.24	208	0.51	*

CYCLE= 60.0 LOST= 6.0 SUM V/S CRIT= 0.46 TOTAL V/C= 0.51

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.44	0.66	60.0	3.65	2361	0.09	0.85	3.18	A	5.5	6
WB	TH	0.51	0.66	60.0	3.92	2361	0.16	0.85	3.46	A	6.4	6
SB	LT-RT	0.51	0.24	60.0	15.07	208	1.71	1.00	16.78	C	1.3	2

DIR	Delay	LOS
EB	3.18	A
WB	3.46	A
SB	16.78	C

INTERSECTION DELAY = 3.94 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF 60 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 11.6 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
RUGGLES STREET/BUSWAY (OUTBOUND)
EXISTING CONDITIONS: SAT PEAK HOUR
date:12-22-1988 time:15:50:15
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I4SAT GEOMETRICS=P18INT4 SIGNAL=P18INT4
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	987	0	0	2	0	0.0	12.0	0.0	50
WB	0	797	0	0	2	0	0.0	12.0	0.0	50
NB	0	0	0	0	0	0	0.0	0.0	0.0	0
SB	66	0	13	0	1	0	0.0	15.0	0.0	36

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.880	50	N	16.5	3
WB	0.0%	2.0%	N	0	0	.880	50	N	16.5	3
NB	0.0%	0.0%	N	0	0	.860	0	N	13.0	3
SB	2.0%	%100.0%	N	0	0	.880	50	N	13.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*				*	*									*	41.2	3	A
2				*				*						*			12.8	3	A

CYCLE= 60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	987	0	.880	0	1122	0
WB	0	797	0	.880	0	906	0
NB	0	0	0	.860	0	0	0
SB	66	0	13	.880	75	0	15

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	1122	2	1.05	1178	0.00	0.00
WB	TH	906	2	1.05	951	0.00	0.00
SB	LT-RT	90	1	1.00	90	0.84	0.16

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
SOUTHBOUND	0	0	0	0	0	0	0	0	0	0

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3564
WB	TH	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3564
SB	LT-RT	1800	1	1.100	0.667	0.990	1.000	1.000	1.000	0.874	0.767	876

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	1178	3564	0.33	0.69	2449	0.48	*
WB	TH	951	3564	0.27	0.69	2449	0.39	
SB	LT-RT	90	876	0.10	0.21	187	0.48	*

CYCLE= 60.0 LOST= 6.0 SUM V/S CRIT= 0.43 TOTAL V/C= 0.48

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.48	0.69	60.0	3.34	2449	0.12	0.85	2.94	A	5.9	6
WB	TH	0.39	0.69	60.0	3.05	2449	0.05	0.85	2.64	A	4.7	5
SB	LT-RT	0.48	0.21	60.0	15.73	187	1.53	1.00	17.27	C	1.2	2

DIR	Delay	LOS
EB	2.94	A
WB	2.64	A
SB	17.27	C

INTERSECTION DELAY = 3.39 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF 60 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 11.0 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/PRENTISS
EXISTING CONDITIONS - AM PEAK HOUR
date:08-17-1989 time:11:34:00
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I5AM GEOMETRICS=P18INT5 SIGNAL=P18INT5
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	62	0	22	0	1	0	0.0	13.0	0.0	26
WB	0	0	0	0	0	0	0.0	0.0	0.0	0
NB	261	1850	0	0	3	0	0.0	11.0	0.0	68
SB	0	888	111	0	3	0	0.0	11.0	0.0	68

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.960	50	N	10.5	3
WB	0.0%	0.0%	N	0	0	.000	0	N	10.5	0
NB	0.0%	2.0%	N	0	5	.960	50	N	21.0	3
SB	0.0%	2.0%	N	0	5	.960	50	N	21.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*						*	*				*	*	84.5	3	A
2	*		*									*			*	*	9.5	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	62	0	22	.960	65	0	23
WB	0	0	0	.000	301	355	0
NB	261	1850	0	.960	272	1927	0
SB	0	888	111	.960	0	925	116

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-RT	88	1	1.00	88	0.74	0.26
NB	LT-TH	2199	3	1.10	2419	0.12	0.00
SB	TH-RT	1041	3	1.10	1145	0.00	0.11

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	301	355	0	0	0	0	0	0	0	0
NORTHBOUND	0	925	116	100	100	85	0	3	0	1023

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-RT	1800	1	1.033	0.990	1.000	1.000	1.000	1.000	0.858	0.783	1237
NB	LT-TH	1800	3	0.967	0.990	1.000	1.000	0.993	1.000	1.000	0.749	3846
SB	TH-RT	1800	3	0.967	0.990	1.000	1.000	0.993	1.000	0.981	1.000	5035

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
NB	100	85	3	2199	1399	272	0.12	3	1023	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
NB	5400	0.189	80.886	0.236	1.000	3.620	0.000	0.000	4.771	0.248	0.749

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-RT	88	1237	0.07	0.09	117	0.74	*
NB	LT-TH	2419	3846	0.63	0.85	3250	0.74	*
SB	TH-RT	1145	5035	0.23	0.85	4255	0.27	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.70 TOTAL V/C= 0.74

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-RT	0.74	0.09	100.0	33.50	117	14.67	1.00	48.17	E	2.3	4
NB	LT-TH	0.74	0.85	100.0	2.46	3250	0.68	0.85	2.67	A	9.5	9
SB	TH-RT	0.27	0.85	100.0	1.18	4255	0.01	0.85	1.01	A	4.5	4

DIR	Delay	LOS
EB	48.17	E
NB	2.67	A
SB	1.01	A

INTERSECTION DELAY = 3.24 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 22.8 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/PRENTISS
EXISTING CONDITIONS - PM PEAK HOUR
date:08-17-1989 time:11:43:14
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I5PM GEOMETRICS=P18INT5 SIGNAL=P18INT5
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	85	0	57	0	1	0	0.0	13.0	0.0	26
WB	0	0	0	0	0	0	0.0	0.0	0.0	0
NB	98	1346	0	0	3	0	0.0	11.0	0.0	68
SB	0	1556	88	0	3	0	0.0	11.0	0.0	68

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	50	N	10.5	3
WB	0.0%	0.0%	N	0	0	.000	0	N	10.5	0
NB	0.0%	2.0%	N	0	5	.950	50	N	21.0	3
SB	0.0%	2.0%	N	0	5	.950	50	N	21.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*						*	*			*	*		75.0	3	A
2	*		*									*			*	*	19.0	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	85	0	57	.950	89	0	60
WB	0	0	0	.000	0	0	0
NB	98	1346	0	.950	103	1417	0
SB	0	1556	88	.950	0	1638	93

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-RT	149	1	1.00	149	0.60	0.40
NB	LT-TH	1520	3	1.10	1672	0.07	0.00
SB	TH-RT	1731	3	1.10	1904	0.00	0.05

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	0	0	0	0	0	0	0	0	0
NORTHBOUND	0	1638	93	100	100	75	0	3	0	1399

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-RT	1800	1	1.033	0.990	1.000	1.000	1.000	1.000	0.836	0.805	1240
NB	LT-TH	1800	3	0.967	0.990	1.000	1.000	0.993	1.000	1.000	0.685	3514
SB	TH-RT	1800	3	0.967	0.990	1.000	1.000	0.993	1.000	0.991	1.000	5086

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
NB	100	75	3	1520	1399	103	0.07	3	1399	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
NB	5400	0.259	66.251	0.001	1.000	8.744	0.000	0.000	1800.000	0.054	0.685

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-RT	149	1240	0.12	0.19	236	0.63	*
NB	LT-TH	1672	3514	0.48	0.75	2635	0.63	*
SB	TH-RT	1904	5086	0.37	0.75	3814	0.50	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.60 TOTAL V/C= 0.63

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-RT	0.63	0.19	100.0	28.35	236	3.82	1.00	32.16	D	3.4	5
NB	LT-TH	0.63	0.75	100.0	4.53	2635	0.36	0.85	4.16	A	10.6	11
SB	TH-RT	0.50	0.75	100.0	3.80	3814	0.09	0.85	3.30	A	12.0	12

DIR	Delay	LOS
EB	32.16	D
NB	4.16	A
SB	3.30	A

INTERSECTION DELAY = 4.85 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 16.1 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/PRENTISS
EXISTING CONDITIONS - SAT PEAK HOUR
date:08-17-1989 time:12:09:08
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I5SAT GEOMETRICS=P18INT5 SIGNAL=P18INT5
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	22	0	23	0	1	0	0.0	13.0	0.0	26
WB	0	0	0	0	0	0	0.0	0.0	0.0	0
NB	49	1470	0	0	3	0	0.0	11.0	0.0	68
SB	0	1301	39	0	3	0	0.0	11.0	0.0	68

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.930	50	N	10.5	3
WB	0.0%	0.0%	N	0	0	.000	0	N	10.5	0
NB	0.0%	2.0%	N	0	5	.930	50	N	21.0	3
SB	0.0%	2.0%	N	0	5	.930	50	N	21.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*					*	*				*	*		87.4	3	A
2	*		*									*			*	*	6.6	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	22	0	23	.930	24	0	25
WB	0	0	0	.000	0	0	0
NB	49	1470	0	.930	53	1581	0
SB	0	1301	39	.930	0	1399	42

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-RT	48	1	1.00	48	0.49	0.51
NB	LT-TH	1633	3	1.10	1797	0.03	0.00
SB	TH-RT	1441	3	1.10	1585	0.00	0.03

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH			% OPPOSING LEFT TURN			# LANES			OPPOSING
BEING OPPOSED	VOLUMES									
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	0	0	0	0	0	0	0	0	0
NORTHBOUND	0	1399	42	100	100	87	0	3	0	1399

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-RT	1800	1	1.033	0.990	1.000	1.000	1.000	1.000	0.819	0.822	1240
NB	LT-TH	1800	3	0.967	0.990	1.000	1.000	0.993	1.000	1.000	0.682	3501
SB	TH-RT	1800	3	0.967	0.990	1.000	1.000	0.993	1.000	0.995	1.000	5107

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
NB	100	87	3	1633	1399	53	0.03	3	1399	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
NB	5400	0.259	82.937	0.001	1.000	4.421	0.000	0.000	1800.000	0.046	0.682

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-RT	48	1240	0.04	0.07	82	0.59	*
NB	LT-TH	1797	3501	0.51	0.87	3058	0.59	*
SB	TH-RT	1585	5107	0.31	0.87	4461	0.36	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.55 TOTAL V/C= 0.59

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-RT	0.59	0.07	100.0	34.46	82	7.20	1.00	41.67	E	1.3	2
NB	LT-TH	0.59	0.87	100.0	1.25	3058	0.22	0.85	1.25	A	5.7	6
SB	TH-RT	0.36	0.87	100.0	0.88	4461	0.02	0.85	0.77	A	5.1	5

DIR	Delay	LOS
EB	41.67	E
NB	1.25	A
SB	0.77	A

INTERSECTION DELAY = 1.60 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 14.3 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
HUNTINGTON/RUGGLES
EXISTING CONDITIONS - AM PEAK HOUR
date:08-15-1989 time:05:45:29
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I6AM GEOMETRICS=P18INT6E SIGNAL=P18INT6
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	12	423	11	1	1	0	8.0	8.0	0.0	29
WB	169	565	14	1	1	0	11.0	12.0	0.0	29
NB	16	585	229	0	2	1	0.0	11.0	10.0	49
SB	47	546	121	0	2	1	0.0	11.0	9.0	48

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.910	200	N	11.3	3
WB	0.0%	2.0%	N	2	0	.910	200	N	11.3	3
NB	0.0%	2.0%	N	0	10	.910	200	N	16.3	3
SB	0.0%	2.0%	N	0	10	.910	200	N	16.3	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*	*	*	*		*	*	*		38.0	3	A
2					*	*	*					*				*	2.1	0	A
3	*	*	*		*	*	*					*				*	53.9	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	12	423	11	.910	13	465	12
WB	169	565	14	.910	186	621	15
NB	16	585	229	.910	18	643	252
SB	47	546	121	.910	52	600	133

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	13	1	1.00	13	1.00	0.00
EB	TH-RT	477	1	1.00	477	0.00	0.03
WB	LT	186	1	1.00	186	1.00	0.00
WB	TH-RT	636	1	1.00	636	0.00	0.02
NB	LT-TH	660	2	1.05	693	0.03	0.00
NB	RT	252	1	1.00	252	0.00	1.00
SB	LT-TH	652	2	1.05	684	0.08	0.00
SB	RT	133	1	1.00	133	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	186	621	15	0	96	96	1	1	0	612
WESTBOUND	13	465	12	100	100	100	1	1	0	477
NORTHBOUND	52	600	133	100	100	0	0	2	1	652
SOUTHBOUND	18	643	252	100	100	0	0	2	1	660

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	1	0.867	0.990	1.000	1.000	1.000	1.000	1.000	0.319	492
EB	TH-RT	1800	1	0.867	0.990	1.000	1.000	1.000	1.000	0.994	1.000	1535

```
WB  LT        1800  1 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.950 1637
WB  TH-RT     1800  1 1.000 0.990 1.000 1.000 1.000 1.000 0.994 1.000 1772
NB  LT-TH     1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.910 3136
NB  RT        1800  1 0.933 0.990 1.000 1.000 0.958 1.000 0.755 1.000 1203
SB  LT-TH     1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.814 2806
SB  RT        1800  1 0.900 0.990 1.000 1.000 0.958 1.000 0.755 1.000 1160

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
EB 100  54  1   13  477   13 1.00  1  612 0.00
NB 100  38  2  660  912   18 0.03  2  652 0.08
SB 100  38  2  652  785   52 0.08  2  660 0.03
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf      El    Fm    Flt
EB 1800 0.340 30.110 0.492 1.000 23.778 0.000  0.000   2.285 0.319 0.319
NB 2968 0.220 20.570 0.468 0.098 17.442 0.902 10.906   2.405 0.820 0.910
SB 3425 0.193 23.201 0.462 0.277 14.811 0.723  4.745   2.434 0.629 0.814

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT         13  492 0.03 0.54  265 0.05
EB  TH-RT     477 1535 0.31 0.54  827 0.58
WB  LT        186 1637 0.01 0.02  433 0.43
WB  TH-RT     636 1772 0.36 0.56  992 0.64      *
NB  LT-TH     693 3136 0.22 0.38 1192 0.58
NB  RT        252 1203 0.21 0.38  457 0.55
SB  LT-TH     684 2806 0.24 0.38 1067 0.64      *
SB  RT        133 1160 0.11 0.38  441 0.30

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.60 TOTAL V/C= 0.64
FOR THE WESTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  329 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT       0.05 0.54 100.0   8.30  265   0.00 0.85    7.06  B   0.2    1
EB  TH-RT    0.58 0.54 100.0  11.72  827   0.75 0.85   10.60  B   6.1    6
WB  LT       0.43 0.56 100.0   9.69  433   0.44 1.00   10.13  B   5.1    5
WB  TH-RT    0.64 0.56 100.0  11.49  992   1.01 0.85   10.62  B   7.8    8
NB  LT-TH    0.58 0.38 100.0  18.75 1192   0.54 0.85   16.39  C  11.4   11
NB  RT       0.55 0.38 100.0  18.46  457   1.10 0.85   16.62  C   4.3    4
SB  LT-TH    0.64 0.38 100.0  19.31 1067   0.94 0.85   17.21  C  11.2   11
SB  RT       0.30 0.38 100.0  16.49  441   0.12 0.85   14.12  B   2.3    2

DIR Delay LOS
EB  10.50  B
WB  10.51  B
NB  16.46  C
SB  16.71  C
INTERSECTION DELAY = 13.98 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS
:
FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  16.4 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  38.0 secs green,   3.0 secs yellow + red clear
suggested timing phase 2 is   1.6 secs green,   0.0 secs yellow + red clear
suggested timing phase 3 is  54.4 secs green,   3.0 secs yellow + red clear
```

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
HUNTINGTON/RUGGLES
EXISTING CONDITIONS - PM PEAK HOUR
date:08-15-1989 time:05:52:35
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I6PM GEOMETRICS=P18INT6E SIGNAL=P18INT6
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	83	479	36	1	1	0	8.0	8.0	0.0	29
WB	313	644	63	1	1	0	11.0	12.0	0.0	29
NB	6	779	448	0	2	1	0.0	11.0	10.0	49
SB	66	727	90	0	2	1	0.0	11.0	9.0	48

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.820	200	N	11.3	3
WB	0.0%	2.0%	N	0	0	.820	200	N	11.3	3
NB	0.0%	2.0%	N	0	10	.820	200	N	16.3	3
SB	0.0%	2.0%	N	0	10	.820	200	N	16.3	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*	*	*	*		*	*	*		41.1	3	A
2					*	*	*					*				*	14.0	0	A
3	*	*	*		*	*	*					*				*	38.9	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	83	479	36	.820	101	584	44
WB	313	644	63	.820	382	785	77
NB	6	779	448	.820	7	950	546
SB	66	727	90	.820	80	887	110

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	101	1	1.00	101	1.00	0.00
EB	TH-RT	628	1	1.00	628	0.00	0.07
WB	LT	382	1	1.00	382	1.00	0.00
WB	TH-RT	862	1	1.00	862	0.00	0.09
NB	LT-TH	957	2	1.05	1005	0.01	0.00
NB	RT	546	1	1.00	546	0.00	1.00
SB	LT-TH	967	2	1.05	1015	0.08	0.00
SB	RT	110	1	1.00	110	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	382	785	77	0	74	74	1	1	0	634
WESTBOUND	101	584	44	100	100	100	1	1	0	628
NORTHBOUND	80	887	110	100	100	0	0	2	1	967
SOUTHBOUND	7	950	546	100	100	0	0	2	1	957

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	1	0.867	0.990	1.000	1.000	1.000	1.000	1.000	0.165	255
EB	TH-RT	1800	1	0.867	0.990	1.000	1.000	1.000	1.000	0.983	1.000	1518

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WB  LT        1800  1 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.950 1637
WB  TH-RT     1800  1 1.000 0.990 1.000 1.000 1.000 1.000 0.978 1.000 1743
NB  LT-TH     1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.761 2621
NB  RT        1800  1 0.933 0.990 1.000 1.000 0.958 1.000 0.755 1.000 1203
SB  LT-TH     1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.664 2287
SB  RT        1800  1 0.900 0.990 1.000 1.000 0.958 1.000 0.755 1.000 1160

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
EB 100  39  1  101  628  101 1.00  1  634 0.00
NB 100  41  2  957 1399    7 0.01  2  967 0.08
SB 100  41  2  967 1077   80 0.08  2  957 0.01
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf      El    Fm   Flt
EB 1800 0.352  5.674 0.479 1.000 33.217 0.000  0.000   2.350 0.165 0.165
NB   24 1.000  0.000 0.271 0.077 41.100 0.923 19.278   4.158 0.521 0.761
SB 3479 0.275 18.735 0.277 0.436 22.365 0.564  2.578   4.066 0.328 0.664

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT        101  255 0.40 0.39   99 1.02
EB  TH-RT     628 1518 0.41 0.39  590 1.06     *
WB  LT        382 1637 0.16 0.14  344 1.11     *
WB  TH-RT     862 1743 0.49 0.53  922 0.93
NB  LT-TH    1005 2621 0.38 0.41 1077 0.93
NB  RT        546 1203 0.45 0.41  494 1.10     *
SB  LT-TH    1015 2287 0.44 0.41  940 1.08
SB  RT        110 1160 0.09 0.41  477 0.23

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 1.02 TOTAL V/C= 1.09
FOR THE WESTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  45 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1     c      d2    PF   Delay LOS Avg Q  95% Q
EB  LT        1.02 0.39 100.0 23.54   99   77.32 0.85   85.73  F   3.3    8
EB  TH-RT     1.06 0.39 100.0 24.20  590   47.99 0.85   61.36  F  16.0   33
WB  LT        1.11 0.53 100.0 20.45  344   77.76 1.00   98.21  F  15.0   32
WB  TH-RT     0.93 0.53 100.0 16.68  922   11.79 0.85   24.20  C  11.4   18
NB  LT-TH     0.93 0.41 100.0 21.38 1077   10.31 0.85   26.94  D  15.7   22
NB  RT        1.10 0.41 100.0 24.15  494   67.80 0.85   78.16  F  16.3   37
SB  LT-TH     1.08 0.41 100.0 23.71  940   48.00 0.85   60.96  F  24.3   50
SB  RT        0.23 0.41 100.0 14.56  477    0.05 0.85   12.42  B   1.8    2

DIR Delay LOS
EB  64.74  F
WB  46.91  E
NB  44.98  E
SB  56.22  E
INTERSECTION DELAY = 51.32 INTERSECTION LOS=E

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS
:
THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
for chosen cycle length 100.0
suggested timing phase 1 is  41.7 secs green,   3.0 secs yellow + red clear
suggested timing phase 2 is  14.3 secs green,   0.0 secs yellow + red clear
suggested timing phase 3 is  38.0 secs green,   3.0 secs yellow + red clear
```

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
HUNTINGTON/RUGGLES
EXISTING CONDITIONS - SAT PEAK HOUR
date:08-15-1989 time:05:55:48
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I6SAT GEOMETRICS=P18INT6E SIGNAL=P18INT6
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	54	301	30	1	1	0	8.0	8.0	0.0	29
WB	133	359	28	1	1	0	11.0	12.0	0.0	29
NB	15	793	175	0	2	1	0.0	11.0	10.0	49
SB	47	753	118	0	2	1	0.0	11.0	9.0	48

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.940	100	N	11.3	3
WB	0.0%	2.0%	N	2	0	.940	100	N	11.3	3
NB	0.0%	2.0%	N	0	10	.940	200	N	16.3	3
SB	0.0%	2.0%	N	0	10	.940	200	N	16.3	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*	*	*	*		*	*	*		53.4	3	A
2					*	*	*					*				*	2.3	0	A
3	*	*	*		*	*	*					*				*	38.4	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	54	301	30	.940	57	320	32
WB	133	359	28	.940	141	382	30
NB	15	793	175	.940	16	844	186
SB	47	753	118	.940	50	801	126

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	57	1	1.00	57	1.00	0.00
EB	TH-RT	352	1	1.00	352	0.00	0.09
WB	LT	141	1	1.00	141	1.00	0.00
WB	TH-RT	412	1	1.00	412	0.00	0.07
NB	LT-TH	860	2	1.05	903	0.02	0.00
NB	RT	186	1	1.00	186	0.00	1.00
SB	LT-TH	851	2	1.05	894	0.06	0.00
SB	RT	126	1	1.00	126	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	141	382	30	0	94	94	1	1	0	389
WESTBOUND	57	320	32	100	100	100	1	1	0	352
NORTHBOUND	50	801	126	100	100	0	0	2	1	851
SOUTHBOUND	16	844	186	100	100	0	0	2	1	860

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	1	0.867	0.990	1.000	1.000	1.000	1.000	1.000	0.417	645
EB	TH-RT	1800	1	0.867	0.990	1.000	1.000	1.000	1.000	0.978	1.000	1510

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WB  LT        1800  1 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.950 1637
WB  TH-RT     1800  1 1.000 0.990 1.000 1.000 1.000 1.000 0.982 1.000 1751
NB  LT-TH     1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.909 3133
NB  RT        1800  1 0.933 0.990 1.000 1.000 0.958 1.000 0.802 1.000 1279
SB  LT-TH     1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.801 2759
SB  RT        1800  1 0.900 0.990 1.000 1.000 0.958 1.000 0.802 1.000 1233

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
EB 100  38  1   57  352   57 1.00  1  389 0.00
NB 100  53  2  860 1046   16 0.02  2  851 0.06
SB 100  53  2  851  977   50 0.06  2  860 0.02
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf     El    Fm   Flt
EB 1800 0.216 21.373 0.632 1.000 16.980 0.000  0.000  1.780 0.417 0.417
NB 2904 0.293 34.050 0.343 0.080 19.329 0.920 12.739  3.279 0.819 0.909
SB 3395 0.253 37.574 0.338 0.241 15.805 0.759  5.582  3.331 0.602 0.801

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT         57  645 0.09 0.38  247 0.23
EB  TH-RT     352 1510 0.23 0.38  579 0.61     *
WB  LT        141 1637 0.01 0.02  340 0.42     *
WB  TH-RT     412 1751 0.24 0.41  711 0.58
NB  LT-TH     903 3133 0.29 0.53 1673 0.54
NB  RT        186 1279 0.15 0.53  683 0.27
SB  LT-TH     894 2759 0.32 0.53 1473 0.61     *
SB  RT        126 1233 0.10 0.53  658 0.19

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.57 TOTAL V/C= 0.60
FOR THE WESTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  234 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1     c      d2    PF   Delay LOS Avg Q  95% Q
EB  LT       0.23 0.38 100.0  15.85  247    0.09 0.85   13.55  B    1.0    1
EB  TH-RT    0.61 0.38 100.0  18.83  579    1.33 0.85   17.14  C    6.0    6
WB  LT       0.42 0.41 100.0  16.12  340    0.49 1.00   16.61  C    3.8    4
WB  TH-RT    0.58 0.41 100.0  17.52  711    0.88 0.85   15.64  C    6.8    7
NB  LT-TH    0.54 0.53 100.0  11.60 1673    0.28 0.85   10.10  B   11.1   11
NB  RT       0.27 0.53 100.0   9.67  683    0.06 0.85    8.26  B    2.4    2
SB  LT-TH    0.61 0.53 100.0  12.22 1473    0.53 0.85   10.83  B   11.0   11
SB  RT       0.19 0.53 100.0   9.20  658    0.02 0.85    7.83  B    1.6    2

DIR Delay LOS
EB  16.64  C
WB  15.89  C
NB   9.79  B
SB  10.46  B
INTERSECTION DELAY = 12.02 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  14.9 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  53.7 secs green,   3.0 secs yellow + red clear
suggested timing phase 2 is   1.6 secs green,   0.0 secs yellow + red clear
suggested timing phase 3 is  38.7 secs green,   3.0 secs yellow + red clear
```

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/COLUMBUS/NEW DUDLEY
EXISTING CONDITIONS - AM PEAK HOUR
date:08-13-1989 time:21:31:41
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I7AM GEOMETRICS=P18INT7 SIGNAL=P18INT7
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	206	211	198	0	2	0	0.0	12.0	0.0	50
WB	24	375	0	0	2	0	0.0	12.0	0.0	50
NB	397	1654	46	1	3	0	10.0	11.0	0.0	47
SB	177	499	166	1	3	0	10.0	11.0	0.0	46

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.940	100	N	16.5	3
WB	0.0%	2.0%	N	0	0	.940	200	N	16.5	3
NB	0.0%	2.0%	N	0	5	.940	200	N	15.8	3
SB	0.0%	2.0%	N	0	5	.940	100	N	15.8	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*									*				*	5.0	0	A
2	*	*	*		*	*						*				*	25.6	3	A
3				*				*	*				*				13.6	0	A
4				*				*	*	*	*		*	*	*		49.8	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	206	211	198	.940	219	224	211
WB	24	375	0	.940	26	399	0
NB	397	1654	46	.940	422	1760	49
SB	177	499	166	.940	188	531	177

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	654	2	1.05	687	0.33	0.32
WB	LT-TH	424	2	1.05	446	0.06	0.00
NB	LT	422	1	1.00	422	1.00	0.00
NB	TH-RT	1809	3	1.10	1989	0.00	0.03
SB	LT	188	1	1.00	188	1.00	0.00
SB	TH-RT	707	3	1.10	778	0.00	0.25

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	26	399	0	100	100	0	0	2	0	424
WESTBOUND	219	224	211	84	84	84	0	2	0	547
NORTHBOUND	188	531	177	100	100	100	1	3	0	707
SOUTHBOUND	422	1760	49	100	100	100	1	3	0	1399

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.921	0.874	2869
WB	LT-TH	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	1.000	0.778	2772
NB	LT	1800	1	0.933	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1580

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NB  TH-RT     1800  3 0.967 0.990 1.000 1.000 0.993 1.000 0.993 1.000 5098
SB  LT        1800  1 0.933 0.990 1.000 1.000 1.000 1.000 1.000 0.950 1580
SB  TH-RT     1800  3 0.967 0.990 1.000 1.000 0.993 1.000 0.951 1.000 4879

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB 100  26  2  424  424   26 0.06  2  547 0.33
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf      El    Fm   Flt
WB 2806 0.195  7.533 0.533 0.241 18.042 0.759  5.779   2.111 0.555 0.778

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT  687 2869 0.24 0.31  877 0.78     *
WB  LT-TH     446 2772 0.16 0.26  709 0.63
NB  LT        422 1580 0.10 0.14  552 0.76     *
NB  TH-RT    1989 5098 0.39 0.50 2540 0.78     *
SB  LT        188 1580 0.09 0.14  282 0.67
SB  TH-RT     778 4879 0.16 0.50 2431 0.32

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.73 TOTAL V/C= 0.78
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  270 ON THE PERMISSIVE PHASE
FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  0 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1     c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.78 0.31 100.0  24.09  877    3.27 0.85   23.25  C  12.6   14
WB  LT-TH    0.63 0.26 100.0  25.08  709    1.27 0.85   22.40  C   8.8    9
NB  LT       0.76 0.63 100.0   9.87  552    4.37 1.00   14.24  B  10.1   10
NB  TH-RT    0.78 0.50 100.0  15.69 2540    1.18 0.85   14.34  B  25.2   25
SB  LT       0.67 0.63 100.0   8.81  282    4.07 1.00   12.88  B   4.5    5
SB  TH-RT    0.32 0.50 100.0  11.39 2431    0.03 0.85    9.70  B   9.9   10

DIR Delay LOS
EB  23.25  C
WB  22.40  C
NB  14.32  B
SB  10.32  B
INTERSECTION DELAY = 15.62 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  26.4 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is   5.0 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  25.6 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  13.3 secs green,   0.0 secs yellow + red clear
suggested timing phase 4 is  50.0 secs green,   3.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/COLUMBUS/NEW DUDLEY
EXISTING CONDITIONS - PM PEAK HOUR
date:08-13-1989 time:21:34:55
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I7PM GEOMETRICS=P18INT7 SIGNAL=P18INT7
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	239	259	447	0	2	0	0.0	12.0	0.0	50
WB	46	341	0	0	2	0	0.0	12.0	0.0	50
NB	279	852	3	1	3	0	10.0	11.0	0.0	47
SB	191	1229	146	1	3	0	10.0	11.0	0.0	46

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	100	N	16.5	3
WB	0.0%	2.0%	N	0	0	.950	200	N	16.5	3
NB	0.0%	2.0%	N	0	5	.950	200	N	15.8	3
SB	0.0%	2.0%	N	0	5	.950	100	N	15.8	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*									*				*	10.0	0	A
2	*	*	*		*	*						*				*	31.4	3	A
3				*					*	*				*			16.8	0	A
4				*					*	*	*	*		*	*	*	35.8	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	239	259	447	.950	252	273	471
WB	46	341	0	.950	48	359	0
NB	279	852	3	.950	294	897	3
SB	191	1229	146	.950	201	1294	154

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	995	2	1.05	1044	0.25	0.47
WB	LT-TH	407	2	1.05	428	0.12	0.00
NB	LT	294	1	1.00	294	1.00	0.00
NB	TH-RT	900	3	1.10	990	0.00	0.00
SB	LT	201	1	1.00	201	1.00	0.00
SB	TH-RT	1447	3	1.10	1592	0.00	0.11

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	48	359	0	100	100	0	0	2	0	407
WESTBOUND	252	273	471	76	76	76	0	2	0	753
NORTHBOUND	201	1294	154	100	100	100	1	3	0	1399
SOUTHBOUND	294	897	3	100	100	100	1	3	0	900

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.884	0.905	2851
WB	LT-TH	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	1.000	0.636	2266
NB	LT	1800	1	0.933	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1580

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NB  TH-RT     1800  3 0.967 0.990 1.000 1.000 0.993 1.000 0.999 1.000 5128
SB  LT        1800  1 0.933 0.990 1.000 1.000 1.000 1.000 1.000 0.950 1580
SB  TH-RT     1800  3 0.967 0.990 1.000 1.000 0.993 1.000 0.979 1.000 5025

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB 100  31  2  407  407   48 0.12  2  753 0.25
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
WB 2986 0.252  8.184 0.404 0.596 23.170 0.404  1.354    2.784 0.272 0.636

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT 1044 2851 0.37 0.41 1180 0.88     *
WB  LT-TH     428 2266 0.19 0.31  710 0.60
NB  LT        294 1580 0.15 0.17  332 0.88     *
NB  TH-RT     990 5128 0.19 0.36 1836 0.54
SB  LT        201 1580 0.08 0.17  438 0.46
SB  TH-RT    1592 5025 0.32 0.36 1799 0.88     *

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.83 TOTAL V/C= 0.88
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  0 ON THE PERMISSIVE PHASE
FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  106 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.88 0.41 100.0  20.60 1180   5.93 0.85   22.55  C  16.2   20
WB  LT-TH    0.60 0.31 100.0  22.07  710   1.05 0.85   19.65  C   7.8    8
NB  LT       0.88 0.53 100.0  15.96  332  16.35 1.00   32.31  D   6.8    9
NB  TH-RT    0.54 0.36 100.0  19.41 1836   0.25 0.85   16.71  C  16.0   16
SB  LT       0.46 0.53 100.0  11.25  438   0.56 1.00   11.81  B   4.6    5
SB  TH-RT    0.88 0.36 100.0  22.92 1799   4.09 0.85   22.96  C  25.8   29

DIR Delay LOS
EB  22.55  C
WB  19.65  C
NB  20.28  C
SB  21.71  C
INTERSECTION DELAY = 21.31 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  48.2 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  10.0 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  31.4 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  16.8 secs green,   0.0 secs yellow + red clear
suggested timing phase 4 is  35.8 secs green,   3.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/COLUMBUS/NEW DUDLEY
EXISTING CONDITIONS - SAT PEAK HOUR
date:08-13-1989 time:21:37:03
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I7SAT GEOMETRICS=P18INT7 SIGNAL=P18INT7
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	208	240	232	0	2	0	0.0	12.0	0.0	50
WB	60	246	0	0	2	0	0.0	12.0	0.0	50
NB	261	978	17	1	3	0	10.0	11.0	0.0	47
SB	182	910	146	1	3	0	10.0	11.0	0.0	46

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.890	100	N	16.5	3
WB	0.0%	2.0%	N	0	0	.890	100	N	16.5	3
NB	0.0%	2.0%	N	0	5	.890	100	N	15.8	3
SB	0.0%	2.0%	N	0	5	.890	100	N	15.8	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*									*				*	8.3	0	A
2	*	*	*		*	*						*				*	29.4	3	A
3				*				*	*				*				19.6	0	A
4				*				*	*	*	*		*	*	*		36.7	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	208	240	232	.890	234	270	261
WB	60	246	0	.890	67	276	0
NB	261	978	17	.890	293	1099	19
SB	182	910	146	.890	204	1022	164

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	764	2	1.05	802	0.31	0.34
WB	LT-TH	344	2	1.05	361	0.20	0.00
NB	LT	293	1	1.00	293	1.00	0.00
NB	TH-RT	1118	3	1.10	1230	0.00	0.02
SB	LT	204	1	1.00	204	1.00	0.00
SB	TH-RT	1187	3	1.10	1305	0.00	0.14

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	67	276	0	100	100	0	0	2	0	344
WESTBOUND	234	270	261	78	78	78	0	2	0	596
NORTHBOUND	204	1022	164	100	100	100	1	3	0	1187
SOUTHBOUND	293	1099	19	100	100	100	1	3	0	1118

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.933	0.900	2991
WB	LT-TH	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	1.000	0.673	2398
NB	LT	1800	1	0.933	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1580

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NB  TH-RT     1800  3 0.967 0.990 1.000 1.000 0.993 1.000 0.997 1.000 5115
SB  LT        1800  1 0.933 0.990 1.000 1.000 1.000 1.000 1.000 0.950 1580
SB  TH-RT     1800  3 0.967 0.990 1.000 1.000 0.993 1.000 0.973 1.000 4992

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB 100  29  2  344  344   67 0.20  2  596 0.31
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf      El    Fm   Flt
WB 2962 0.201 11.586 0.503 0.754 17.787 0.246  0.653   2.238 0.346 0.673

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT  802 2991 0.27 0.38 1126 0.71     *
WB  LT-TH     361 2398 0.15 0.29  704 0.51
NB  LT        293 1580 0.14 0.20  414 0.71     *
NB  TH-RT    1230 5115 0.24 0.37 1878 0.65
SB  LT        204 1580 0.09 0.20  429 0.48
SB  TH-RT    1305 4992 0.26 0.37 1833 0.71     *

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.67 TOTAL V/C= 0.71
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  37 ON THE PERMISSIVE PHASE
FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  53 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.71 0.38 100.0  20.18 1126   1.50 0.85   18.43  C  13.2   13
WB  LT-TH    0.51 0.29 100.0  22.31  704   0.54 0.85   19.42  C   6.7    7
NB  LT       0.71 0.56 100.0  12.06  414   3.79 1.00   15.85  C   6.5    7
NB  TH-RT    0.65 0.37 100.0  20.04 1878   0.59 0.85   17.54  C  19.7   20
SB  LT       0.48 0.56 100.0   9.90  429   0.66 1.00   10.56  B   4.6    5
SB  TH-RT    0.71 0.37 100.0  20.61 1833   0.93 0.85   18.31  C  20.9   21

DIR Delay LOS
EB  18.43  C
WB  19.42  C
NB  17.21  C
SB  17.26  C
INTERSECTION DELAY = 17.65 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  20.3 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is   8.3 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  29.4 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  19.5 secs green,   0.0 secs yellow + red clear
suggested timing phase 4 is  36.8 secs green,   3.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
PARKER/RUGGLES
EXISTING CONDITIONS: AM PEAK HOUR
date:12-22-1988 time:11:12:21
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I8AM GEOMETRICS=P18INT8E SIGNAL=P18INT8
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	19	596	94	0	1	1	0.0	9.0	8.0	28
WB	50	620	92	0	1	0	0.0	15.0	0.0	28
NB	113	234	22	0	1	0	0.0	12.0	0.0	20
SB	117	213	35	0	1	0	0.0	11.0	0.0	20

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.930	100	N	11.0	3
WB	0.0%	2.0%	N	0	0	.930	100	N	11.0	3
NB	0.0%	2.0%	N	0	0	.930	100	N	9.0	3
SB	0.0%	2.0%	Y	0	0	.930	100	N	9.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*	*	*	*		*	*	*		33.2	3	P
2	*	*	*		*	*	*					*				*	50.8	3	P

CYCLE= 90.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	19	596	94	.930	20	641	101
WB	50	620	92	.930	54	667	99
NB	113	234	22	.930	122	252	24
SB	117	213	35	.930	126	229	38

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	661	1	1.00	661	0.03	0.00
EB	RT	101	1	1.00	101	0.00	1.00
WB	LT-TH-RT	819	1	1.00	819	0.07	0.12
NB	LT-TH-RT	397	1	1.00	397	0.31	0.06
SB	LT-TH-RT	392	1	1.00	392	0.32	0.10

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	54	667	99	100	100	100	0	1	0	766
WESTBOUND	20	641	101	100	100	0	0	1	1	641
NORTHBOUND	126	229	38	100	100	100	0	1	0	267
SOUTHBOUND	122	252	24	100	100	100	0	1	0	275

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	1	0.900	0.990	1.000	1.000	1.000	1.000	1.000	0.855	1371
EB	RT	1800	1	0.867	0.990	1.000	1.000	1.000	1.000	0.802	1.000	1239
WB	LT-TH-RT	1800	1	1.100	0.990	1.000	1.000	1.000	1.000	0.878	0.842	1449
NB	LT-TH-RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.889	0.737	1168
SB	LT-TH-RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.882	0.719	1093

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	90	51	1	661	742	20	0.03	1	766	0.07
WB	90	51	1	819	766	54	0.07	1	641	0.03
NB	90	33	1	397	275	122	0.31	1	267	0.32
SB	90	33	1	392	267	126	0.32	1	275	0.31

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	1616	0.474	15.490	0.397	0.031	35.300	0.969	26.681	2.837	0.855	0.855
WB	1703	0.376	27.139	0.474	0.066	23.651	0.934	15.716	2.371	0.842	0.842
NB	1509	0.177	21.025	0.708	0.306	12.185	0.694	4.043	1.588	0.737	0.737
SB	1525	0.180	20.704	0.703	0.321	12.506	0.679	3.861	1.600	0.719	0.719

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH	661	1371	0.48	0.56	773	0.85	
EB	RT	101	1239	0.08	0.56	699	0.14	
WB	LT-TH-RT	819	1449	0.57	0.56	817	1.00	*
NB	LT-TH-RT	397	1168	0.34	0.37	431	0.92	
SB	LT-TH-RT	392	1093	0.36	0.37	403	0.97	*

CYCLE= 90.0 LOST= 6.0 SUM V/S CRIT= 0.92 TOTAL V/C= 0.99

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH	0.85	0.56	90.0	12.54	773	6.54	1.00	19.09	C	7.2	11
EB	RT	0.14	0.56	90.0	7.07	699	0.01	1.00	7.07	B	1.1	1
WB	LT-TH-RT	1.00	0.56	90.0	14.94	817	24.75	1.00	39.69	D	13.5	28
NB	LT-TH-RT	0.92	0.37	90.0	20.63	431	17.91	1.00	38.54	D	7.4	14
SB	LT-TH-RT	0.97	0.37	90.0	21.25	403	28.18	1.00	49.44	E	8.5	17

DIR	Delay	LOS
EB	17.49	C
WB	39.69	D
NB	38.54	D
SB	49.44	E

INTERSECTION DELAY = 33.97 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF 60 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 90.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 226.9 SECONDS
for chosen cycle length 90.0
suggested timing phase 1 is 32.6 secs green, 3.0 secs yellow + red clear
suggested timing phase 2 is 51.4 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
PARKER/RUGGLES
EXISTING CONDITIONS: PM PEAK HOUR
date:12-22-1988 time:11:18:56
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I8PM GEOMETRICS=P18INT8E SIGNAL=P18INT8
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	28	755	102	0	1	1	0.0	9.0	8.0	28
WB	30	833	91	0	1	0	0.0	15.0	0.0	28
NB	88	161	29	0	1	0	0.0	12.0	0.0	20
SB	149	234	25	0	1	0	0.0	11.0	0.0	20

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.970	100	N	11.0	3
WB	0.0%	2.0%	N	0	0	.970	100	N	11.0	3
NB	0.0%	2.0%	N	10	0	.970	100	N	9.0	3
SB	0.0%	2.0%	Y	0	0	.970	100	N	9.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*	*	*	*		*	*	*		28.8	3	P
2	*	*	*		*	*	*					*				*	55.2	3	P

CYCLE= 90.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	28	755	102	.970	29	778	105
WB	30	833	91	.970	31	859	94
NB	88	161	29	.970	91	166	30
SB	149	234	25	.970	154	241	26

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	807	1	1.00	807	0.04	0.00
EB	RT	105	1	1.00	105	0.00	1.00
WB	LT-TH-RT	984	1	1.00	984	0.03	0.10
NB	LT-TH-RT	287	1	1.00	287	0.32	0.10
SB	LT-TH-RT	421	1	1.00	421	0.37	0.06

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	31	859	94	100	100	100	0	1	0	953
WESTBOUND	29	778	105	100	100	0	0	1	1	778
NORTHBOUND	154	241	26	100	100	100	0	1	0	267
SOUTHBOUND	91	166	30	100	100	100	0	1	0	196

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	1	0.900	0.990	1.000	1.000	1.000	1.000	1.000	0.740	1187
EB	RT	1800	1	0.867	0.990	1.000	1.000	1.000	1.000	0.802	1.000	1239
WB	LT-TH-RT	1800	1	1.100	0.990	1.000	1.000	1.000	1.000	0.883	0.881	1524
NB	LT-TH-RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.881	0.691	1085
SB	LT-TH-RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.889	0.780	1195

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	90	55	1	807	884	29	0.04	1	953	0.03
WB	90	55	1	984	953	31	0.03	1	778	0.04
NB	90	29	1	287	196	91	0.32	1	267	0.37
SB	90	29	1	421	267	154	0.37	1	196	0.32

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	1670	0.571	8.988	0.280	0.036	46.223	0.964	30.684	4.023	0.740	0.740
WB	1624	0.479	23.205	0.389	0.031	32.006	0.969	24.658	2.896	0.881	0.881
NB	1524	0.175	15.792	0.708	0.317	12.997	0.683	3.954	1.589	0.691	0.691
SB	1517	0.129	19.716	0.753	0.365	9.074	0.635	3.034	1.495	0.780	0.780

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH	807	1187	0.68	0.61	728	1.11	*
EB	RT	105	1239	0.08	0.61	760	0.14	
WB	LT-TH-RT	984	1524	0.65	0.61	935	1.05	
NB	LT-TH-RT	287	1085	0.26	0.32	347	0.83	
SB	LT-TH-RT	421	1195	0.35	0.32	382	1.10	*

CYCLE= 90.0 LOST= 6.0 SUM V/S CRIT= 1.03 TOTAL V/C= 1.11

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH	1.11	0.61	90.0	15.96	728	63.39	1.00	79.35	F	21.7	54
EB	RT	0.14	0.61	90.0	5.58	760	0.01	1.00	5.59	B	1.0	1
WB	LT-TH-RT	1.05	0.61	90.0	14.41	935	37.58	1.00	52.00	E	19.0	44
NB	LT-TH-RT	0.83	0.32	90.0	21.50	347	10.29	1.00	31.79	D	5.0	8
SB	LT-TH-RT	1.10	0.32	90.0	24.42	382	70.76	1.00	95.18	F	14.7	34

DIR	Delay	LOS
EB	70.85	F
WB	52.00	E
NB	31.79	D
SB	95.18	F

INTERSECTION DELAY = 63.36 INTERSECTION LOS=F

THE CYCLE LENGTH WITHIN THE BOUNDS OF 60 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 90.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
for chosen cycle length 90.0
suggested timing phase 1 is 28.7 secs green, 3.0 secs yellow + red clear
suggested timing phase 2 is 55.3 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
PARKER/RUGGLES
EXISTING CONDITIONS: SAT PEAK HOUR
date:12-22-1988 time:11:35:57
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I8SAT GEOMETRICS=P18INT8E SIGNAL=P18INT8
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	6	444	31	0	1	1	0.0	9.0	8.0	28
WB	22	474	95	0	1	0	0.0	15.0	0.0	28
NB	40	104	23	0	1	0	0.0	12.0	0.0	20
SB	125	198	12	0	1	0	0.0	11.0	0.0	20

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.880	50	N	11.0	3
WB	0.0%	2.0%	N	0	0	.880	50	N	11.0	3
NB	0.0%	2.0%	N	10	0	.880	50	N	9.0	3
SB	0.0%	2.0%	Y	0	0	.880	50	N	9.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*	*	*	*		*	*	*		35.2	3	P
2	*	*	*		*	*	*					*				*	48.8	3	P

CYCLE= 90.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	6	444	31	.880	7	505	35
WB	22	474	95	.880	25	539	108
NB	40	104	23	.880	45	118	26
SB	125	198	12	.880	142	225	14

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	511	1	1.00	511	0.01	0.00
EB	RT	35	1	1.00	35	0.00	1.00
WB	LT-TH-RT	672	1	1.00	672	0.04	0.16
NB	LT-TH-RT	190	1	1.00	190	0.24	0.14
SB	LT-TH-RT	381	1	1.00	381	0.37	0.04

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	25	539	108	100	100	100	0	1	0	647
WESTBOUND	7	505	35	100	100	0	0	1	1	505
NORTHBOUND	142	225	14	100	100	100	0	1	0	239
SOUTHBOUND	45	118	26	100	100	100	0	1	0	144

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	1	0.900	0.990	1.000	1.000	1.000	1.000	1.000	0.990	1588
EB	RT	1800	1	0.867	0.990	1.000	1.000	1.000	1.000	0.826	1.000	1276
WB	LT-TH-RT	1800	1	1.100	0.990	1.000	1.000	1.000	1.000	0.874	0.965	1655
NB	LT-TH-RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.878	0.838	1311
SB	LT-TH-RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.894	0.874	1346

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	90	49	1	511	540	7	0.01	1	647	0.04
WB	90	49	1	672	647	25	0.04	1	505	0.01
NB	90	35	1	190	144	45	0.24	1	239	0.37
SB	90	35	1	381	239	142	0.37	1	144	0.24

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	1730	0.374	24.218	0.471	0.013	24.591	0.987	22.517	2.389	0.990	0.990
WB	1767	0.285	32.350	0.560	0.037	16.459	0.963	13.871	2.010	0.965	0.965
NB	1549	0.154	25.213	0.726	0.240	9.979	0.760	4.730	1.550	0.838	0.838
SB	1591	0.091	29.722	0.785	0.373	5.469	0.627	2.423	1.433	0.874	0.874

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH	511	1588	0.32	0.54	861	0.59	
EB	RT	35	1276	0.03	0.54	692	0.05	
WB	LT-TH-RT	672	1655	0.41	0.54	898	0.75	*
NB	LT-TH-RT	190	1311	0.14	0.39	513	0.37	
SB	LT-TH-RT	381	1346	0.28	0.39	526	0.72	*

CYCLE= 90.0 LOST= 6.0 SUM V/S CRIT= 0.69 TOTAL V/C= 0.74

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH	0.59	0.54	90.0	10.57	861	0.81	1.00	11.38	B	5.9	6
EB	RT	0.05	0.54	90.0	7.37	692	0.00	1.00	7.37	B	0.4	1
WB	LT-TH-RT	0.75	0.54	90.0	12.06	898	2.44	1.00	14.50	B	7.7	9
NB	LT-TH-RT	0.37	0.39	90.0	14.83	513	0.22	1.00	15.05	C	2.9	3
SB	LT-TH-RT	0.72	0.39	90.0	17.68	526	3.36	1.00	21.05	C	5.8	8

DIR	Delay	LOS
EB	11.12	B
WB	14.50	B
NB	15.05	C
SB	21.05	C

INTERSECTION DELAY = 14.92 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 60 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 90.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 21.8 SECONDS
for chosen cycle length 90.0
suggested timing phase 1 is 34.5 secs green, 3.0 secs yellow + red clear
suggested timing phase 2 is 49.5 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
COLUMBUS/MELNEA CASS/BUS DRIVE
EXISTING CONDITIONS: AM PEAK HOUR
date:12-22-1988 time:13:11:07
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I9AM GEOMETRICS=P18INT9 SIGNAL=P18INT9
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	2	0	0	1	0	0.0	15.0	0.0	32
WB	26	19	673	0	1	1	0.0	12.0	12.0	26
NB	2	9	16	0	1	1	0.0	12.0	12.0	26
SB	253	8	0	1	1	0	12.0	12.0	0.0	52

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT MIN	TIME	TYPE
EB	0.0%	%100.0%	N	0	0	.950	50	N 9.0		3
WB	0.0%	15.0%	N	0	0	.950	0	N 9.0		3
NB	0.0%	0.0%	N	10	0	.950	50	N 17.0		3
SB	0.0%	2.0%	Y	0	0	.950	50	N 17.0		3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*			*	*					*	*	*		30.0	3	A
2				*				*		*	*						7.0	3	A
3	*	*	*		*	*	*					*				*	20.0	3	A

CYCLE= 66.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	2	0	.950	0	2	0
WB	26	19	673	.950	27	20	708
NB	2	9	16	.950	2	9	17
SB	253	8	0	.950	266	8	0

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	2	1	1.00	2	0.00	0.00
WB	LT-TH	47	1	1.00	47	0.58	0.00
WB	RT	708	1	1.00	708	0.00	1.00
NB	LT-TH	12	1	1.00	12	0.18	0.00
NB	RT	17	1	1.00	17	0.00	1.00
SB	LT	266	1	1.00	266	1.00	0.00
SB	TH	8	1	1.00	8	0.00	0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	2	0	100	100	100	0	1	0	2
NORTHBOUND	266	8	0	0	0	0	1	1	0	0
SOUTHBOUND	2	9	17	0	0	0	0	1	1	0

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	1	1.100	0.667	1.000	1.000	1.000	1.000	1.000	1.000	1320
WB	LT-TH	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	1.000	1.000	1674
WB	RT	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	0.840	1.000	1407
NB	LT-TH	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.871	1568

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NB  RT        1800  1 1.000 1.000 1.000 1.000 1.000 1.000 0.850 1.000 1530
SB  LT        1800  1 1.000 0.990 1.000 1.000 1.000 1.000 1.000 0.950 1693
SB  TH        1800  1 1.000 0.990 1.000 1.000 1.000 1.000 1.000 1.000 1782

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB  66  20  1   47  728   27 0.58  1    2 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
WB 1800 0.001 19.946 0.874 0.578  0.054 0.422  0.034    1.288 1.000 1.000

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH          2 1320 0.00 0.30  400 0.01
WB  LT-TH      47 1674 0.03 0.30  507 0.09
WB  RT        708 1407 0.50 0.80 1130 0.63     *
NB  LT-TH      12 1568 0.01 0.11  166 0.07
NB  RT         17 1530 0.01 0.11  162 0.10     *
SB  LT        266 1693 0.16 0.45  770 0.35
SB  TH          8 1782 0.00 0.45  810 0.01

CYCLE= 66.0  LOST= 6.0  SUM V/S CRIT= 0.51 TOTAL V/C= 0.57

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1     c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.01 0.30  66.0  12.20  400    0.00 0.85   10.37  B   0.0    1
WB  LT-TH    0.09 0.30  66.0  12.54  507    0.00 0.85   10.66  B   0.6    1
WB  RT       0.63 0.80  66.0   1.96 1130    0.80 0.85    2.34  A   2.6    3
NB  LT-TH    0.07 0.11  66.0  20.19  166    0.00 0.85   17.17  C   0.2    1
NB  RT       0.10 0.11  66.0  20.27  162    0.01 0.85   17.23  C   0.3    1
SB  LT       0.35 0.45  66.0   8.85  770    0.11 1.00    8.97  B   2.7    3
SB  TH       0.01 0.45  66.0   7.50  810    0.00 0.85    6.37  B   0.1    1

DIR Delay LOS
EB  10.37  B
WB   2.86  A
NB  17.21  C
SB   8.89  B
INTERSECTION DELAY =  4.82 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  13.1 SECONDS
for chosen cycle length  60.0
suggested timing phase 1 is  42.2 secs green,   3.0 secs yellow + red clear
suggested timing phase 2 is   1.2 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is   7.6 secs green,   3.0 secs yellow + red clear
```

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
COLUMBUS/MELNEA CASS/BUS DRIVE
EXISTING CONDITIONS: PM PEAK HOUR
date:12-22-1988 time:13:18:17
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I9PM GEOMETRICS=P18INT9 SIGNAL=P18INT9
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	1	0	0	1	0	0.0	15.0	0.0	32
WB	23	21	264	0	1	1	0.0	12.0	12.0	26
NB	1	11	34	0	1	1	0.0	12.0	12.0	26
SB	693	31	0	1	1	0	12.0	12.0	0.0	52

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	%100.0%	N	0	0	.930	50	N	9.0	3
WB	0.0%	15.0%	N	0	0	.930	0	N	9.0	3
NB	0.0%	0.0%	N	10	0	.930	50	N	17.0	3
SB	0.0%	2.0%	Y	0	0	.930	50	N	17.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*			*	*					*	*	*		45.6	3	A
2				*				*		*	*						2.5	3	A
3	*	*	*		*	*	*					*				*	2.9	3	A

CYCLE= 60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	1	0	.930	0	1	0
WB	23	21	264	.930	25	23	284
NB	1	11	34	.930	1	12	37
SB	693	31	0	.930	745	33	0

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	1	1	1.00	1	0.00	0.00
WB	LT-TH	47	1	1.00	47	0.52	0.00
WB	RT	284	1	1.00	284	0.00	1.00
NB	LT-TH	13	1	1.00	13	0.08	0.00
NB	RT	37	1	1.00	37	0.00	1.00
SB	LT	745	1	1.00	745	1.00	0.00
SB	TH	33	1	1.00	33	0.00	0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	1	0	100	100	100	0	1	0	1
NORTHBOUND	745	33	0	0	0	0	1	1	0	0
SOUTHBOUND	1	12	37	0	0	0	0	1	1	0

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	1	1.100	0.667	1.000	1.000	1.000	1.000	1.000	1.000	1320
WB	LT-TH	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	1.000	1.000	1674
WB	RT	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	0.849	1.000	1421
NB	LT-TH	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.887	1596

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NB  RT        1800  1 1.000 1.000 1.000 1.000 1.000 1.000 0.850 1.000 1530
SB  LT        1800  1 1.000 0.990 1.000 1.000 1.000 1.000 1.000 0.950 1693
SB  TH        1800  1 1.000 0.990 1.000 1.000 1.000 1.000 1.000 1.000 1782

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB  60   3  1   47  306   25 0.52  1    1 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf      El    Fm   Flt
WB 1800 0.001  2.893 0.874 0.523  0.034 0.477  0.023   1.287 1.000 1.000

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH          1 1320 0.00 0.05   64 0.02
WB  LT-TH      47 1674 0.03 0.05   82 0.58     *
WB  RT        284 1421 0.20 0.86 1220 0.23
NB  LT-TH      13 1596 0.01 0.04   66 0.20
NB  RT         37 1530 0.02 0.04   63 0.58     *
SB  LT        745 1693 0.44 0.76 1287 0.58     *
SB  TH         33 1782 0.02 0.76 1354 0.02

CYCLE= 60.0  LOST= 9.0  SUM V/S CRIT= 0.49 TOTAL V/C= 0.58

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.02 0.05  60.0  20.65   64   0.00 0.85   17.55  C   0.0    1
WB  LT-TH    0.58 0.05  60.0  21.23   82   6.86 0.85   23.87  C   0.8    2
WB  RT       0.23 0.86  60.0   0.57 1220   0.02 0.85    0.50  A   0.7    1
NB  LT-TH    0.20 0.04  60.0  21.13   66   0.19 0.85   18.12  C   0.2    1
NB  RT       0.58 0.04  60.0  21.47   63   8.60 0.85   25.56  D   0.6    1
SB  LT       0.58 0.76  60.0   2.35 1287   0.49 1.00    2.84  A   3.0    3
SB  TH       0.02 0.76  60.0   1.34 1354   0.00 0.85    1.14  A   0.1    1

DIR Delay LOS
EB  17.55  C
WB   3.84  A
NB  23.62  C
SB   2.77  A
INTERSECTION DELAY =  3.97 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  18.7 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
COLUMBUS/MELNEA CASS/BUS DRIVE
EXISTING CONDITIONS: SAT PEAK HOUR
date:12-22-1988 time:13:22:30
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I9SAT GEOMETRICS=P18INT9 SIGNAL=P18INT9
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	1	0	0	1	0	0.0	15.0	0.0	32
WB	14	7	254	0	1	1	0.0	12.0	12.0	26
NB	0	7	51	0	1	1	0.0	12.0	12.0	26
SB	363	49	0	1	1	0	12.0	12.0	0.0	52

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN	TIME	TYPE
EB	0.0%	%100.0%	N	0	0	.950	50	N	9.0	3	
WB	0.0%	15.0%	N	0	0	.950	0	N	9.0	3	
NB	0.0%	0.0%	N	10	0	.950	50	N	17.0	3	
SB	0.0%	2.0%	Y	0	0	.950	50	N	17.0	3	

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*			*	*					*	*	*		42.0	3	A
2				*				*		*	*						6.5	3	A
3	*	*	*		*	*	*					*				*	2.5	3	A

CYCLE= 60.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	1	0	.950	0	1	0
WB	14	7	254	.950	15	7	267
NB	0	7	51	.950	0	7	54
SB	363	49	0	.950	382	52	0

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	1	1	1.00	1	0.00	0.00
WB	LT-TH	22	1	1.00	22	0.67	0.00
WB	RT	267	1	1.00	267	0.00	1.00
NB	TH	7	1	1.00	7	0.00	0.00
NB	RT	54	1	1.00	54	0.00	1.00
SB	LT	382	1	1.00	382	1.00	0.00
SB	TH	52	1	1.00	52	0.00	0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	1	0	100	100	100	0	1	0	1
SOUTHBOUND	0	7	54	0	0	0	0	1	1	0

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	1	1.100	0.667	1.000	1.000	1.000	1.000	1.000	1.000	1320
WB	LT-TH	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	1.000	1.000	1674
WB	RT	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	0.849	1.000	1421
NB	TH	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1800
NB	RT	1800	1	1.000	1.000	1.000	1.000	1.000	1.000	0.850	1.000	1530

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SB  LT        1800  1 1.000 0.990 1.000 1.000 1.000 1.000 1.000 0.950 1693
SB  TH        1800  1 1.000 0.990 1.000 1.000 1.000 1.000 1.000 1.000 1782

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB  60   2  1   22  275   15 0.67  1    1 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
WB 1800 0.001  2.424 0.874 0.667  0.034 0.333  0.018    1.287 1.000 1.000

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH          1 1320 0.00 0.04   54 0.02
WB  LT-TH      22 1674 0.01 0.04   69 0.32      *
WB  RT        267 1421 0.19 0.79 1124 0.24
NB  TH          7 1800 0.00 0.11  196 0.04
NB  RT         54 1530 0.04 0.11  167 0.32      *
SB  LT        382 1693 0.23 0.70 1185 0.32      *
SB  TH         52 1782 0.03 0.70 1248 0.04

CYCLE= 60.0  LOST= 9.0  SUM V/S CRIT= 0.27 TOTAL V/C= 0.32

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.02 0.04  60.0  20.99   54   0.00 0.85  17.84  C   0.0    1
WB  LT-TH    0.32 0.04  60.0  21.25   69   0.96 0.85  18.88  C   0.4    1
WB  RT       0.24 0.79  60.0   1.23 1124   0.02 0.85   1.06  A   0.9    1
NB  TH       0.04 0.11  60.0  18.18  196   0.00 0.85  15.45  C   0.1    1
NB  RT       0.32 0.11  60.0  18.76  167   0.40 0.85  16.29  C   0.8    1
SB  LT       0.32 0.70  60.0   2.65 1185   0.06 1.00   2.70  A   1.9    2
SB  TH       0.04 0.70  60.0   2.11 1248   0.00 0.85   1.79  A   0.3    1

DIR Delay LOS
EB  17.84  C
WB   2.42  A
NB  16.19  C
SB   2.60  A
INTERSECTION DELAY =  3.61 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF  60  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS  60.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  12.6 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
MELNEA CASS/WASHINGTON
EXISTING CONDITIONS - AM PEAK HOUR
date:08-12-1989 time:23:40:10
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I12AM GEOMETRICS=P18INT12 SIGNAL=P18INT12
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	128	882	40	0	2	0	0.0	12.0	0.0	48
WB	50	874	26	0	2	0	0.0	12.0	0.0	48
NB	102	492	26	1	2	0	10.0	11.0	0.0	34
SB	13	166	22	1	2	0	10.0	11.0	0.0	34

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	8.0%	N	0	0	.880	50	N	16.0	3
WB	0.0%	8.0%	N	0	0	.880	50	N	16.0	3
NB	0.0%	12.0%	N	0	20	.880	50	N	12.5	3
SB	0.0%	12.0%	N	0	20	.880	50	N	12.5	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*									*				*	0.0	0	A
2	*	*	*		*	*	*					*				*	69.2	3	A
3				*				*					*	*	*		0.0	0	A
4				*				*	*	*	*	·	*	*	*		24.8	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	128	882	40	.880	145	1002	45
WB	50	874	26	.880	57	993	30
NB	102	492	26	.880	116	559	30
SB	13	166	22	.880	15	189	25

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	1193	2	1.05	1253	0.12	0.04
WB	LT-TH-RT	1080	2	1.05	1134	0.05	0.03
NB	LT	116	1	1.00	116	1.00	0.00
NB	TH-RT	589	2	1.05	618	0.00	0.05
SB	LT	15	1	1.00	15	1.00	0.00
SB	TH-RT	214	2	1.05	224	0.00	0.12

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	57	993	30	100	100	100	0	2	0	1080
WESTBOUND	145	1002	45	100	100	100	0	2	0	1193
NORTHBOUND	15	189	25	0	100	100	1	2	0	214
SOUTHBOUND	116	559	30	100	100	100	1	2	0	589

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	1.000	0.962	1.000	1.000	1.000	1.000	0.993	0.789	2712
WB	LT-TH-RT	1800	2	1.000	0.962	1.000	1.000	1.000	1.000	0.995	0.597	2056
NB	LT	1800	1	0.933	0.943	1.000	1.000	1.000	1.000	1.000	0.694	1100
NB	TH-RT	1800	2	0.967	0.943	1.000	1.000	0.958	1.000	0.991	1.000	3119
SB	LT	1800	1	0.933	0.943	1.000	1.000	1.000	1.000	1.000	0.950	1506
SB	TH-RT	1800	2	0.967	0.943	1.000	1.000	0.958	1.000	0.980	1.000	3082

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
WB	100	69	2	1080	1080	57	0.05	2	1193	0.12
NB	100	25	1	116	589	116	1.00	2	214	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
WB	2304	0.518	35.993	0.129	0.450	33.158	0.550	2.442	8.703	0.194	0.597
NB	3600	0.059	20.109	0.742	1.000	4.740	0.000	0.000	1.517	0.694	0.694

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH-RT	1253	2712	0.46	0.69	1875	0.67	
WB	LT-TH-RT	1134	2056	0.55	0.69	1422	0.80	*
NB	LT	116	1100	0.11	0.25	273	0.42	
NB	TH-RT	618	3119	0.20	0.25	775	0.80	*
SB	LT	15	1506	0.00	0.00	136	0.11	*
SB	TH-RT	224	3082	0.07	0.25	766	0.29	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.75 TOTAL V/C= 0.80
FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
63 LEFT TURNS ON THE CHANGE INTERVAL AND 73 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH-RT	0.67	0.69	100.0	6.72	1875	0.66	0.85	6.27	B	10.2	10
WB	LT-TH-RT	0.80	0.69	100.0	8.06	1422	2.31	0.85	8.82	B	9.3	9
NB	LT	0.42	0.25	100.0	23.99	273	0.66	0.85	20.95	C	2.4	3
NB	TH-RT	0.80	0.25	100.0	26.77	775	4.10	0.85	26.24	D	12.3	14
SB	LT	0.11	0.25	100.0	22.05	136	0.01	1.00	22.07	C	0.4	1
SB	TH-RT	0.29	0.25	100.0	23.14	766	0.06	0.85	19.73	C	4.5	4

DIR	Delay	LOS
EB	6.27	B
WB	8.82	B
NB	25.40	D
SB	19.87	C

INTERSECTION DELAY = 12.28 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 60 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 28.4 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
MELNEA CASS/WASHINGTON
EXISTING CONDITIONS - PM PEAK HOUR
date:08-13-1989 time:00:02:32
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I12PM GEOMETRICS=P18INT12 SIGNAL=P18INT12
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	122	1314	74	0	2	0	0.0	12.0	0.0	48
WB	69	888	20	0	2	0	0.0	12.0	0.0	48
NB	86	376	43	1	2	0	10.0	11.0	0.0	34
SB	40	337	112	1	2	0	10.0	11.0	0.0	34

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	N	0	0	.970	50	N	16.0	3
WB	0.0%	3.0%	N	0	0	.970	50	N	16.0	3
NB	0.0%	8.0%	N	0	20	.970	50	N	12.5	3
SB	0.0%	8.0%	N	0	20	.970	50	N	12.5	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*									*				*	0.0	0	A
2	*	*	*		*	*	*					*				*	73.5	3	A
3				*				*					*	*	*		0.0	0	A
4				*				*	*	*	*		*	*	*		20.5	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	122	1314	74	.970	126	1355	76
WB	69	888	20	.970	71	915	21
NB	86	376	43	.970	89	388	44
SB	40	337	112	.970	41	347	115

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	1557	2	1.05	1635	0.08	0.05
WB	LT-TH-RT	1007	2	1.05	1058	0.07	0.02
NB	LT	89	1	1.00	89	1.00	0.00
NB	TH-RT	432	2	1.05	454	0.00	0.10
SB	LT	41	1	1.00	41	1.00	0.00
SB	TH-RT	463	2	1.05	486	0.00	0.25

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	71	915	21	100	100	100	0	2	0	1007
WESTBOUND	126	1355	76	100	100	100	0	2	0	1399
NORTHBOUND	41	347	115	0	100	100	1	2	0	463
SOUTHBOUND	89	388	44	100	100	100	1	2	0	432

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	1.000	0.985	1.000	1.000	1.000	1.000	0.991	0.878	3089
WB	LT-TH-RT	1800	2	1.000	0.985	1.000	1.000	1.000	1.000	0.996	0.527	1864
NB	LT	1800	1	0.933	0.962	1.000	1.000	1.000	1.000	1.000	0.418	675
NB	TH-RT	1800	2	0.967	0.962	1.000	1.000	0.958	1.000	0.982	1.000	3150
SB	LT	1800	1	0.933	0.962	1.000	1.000	1.000	1.000	1.000	0.950	1535
SB	TH-RT	1800	2	0.967	0.962	1.000	1.000	0.958	1.000	0.957	1.000	3068

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
WB	100	73	2	1007	1007	71	0.07	2	1399	0.08
NB	100	21	1	89	432	89	1.00	2	463	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
WB	2792	0.501	46.845	0.001	1.000	26.636	0.000	0.000	1800.000	0.055	0.527
NB	3600	0.129	8.791	0.586	1.000	11.727	0.000	0.000	1.921	0.418	0.418

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH-RT	1635	3089	0.53	0.73	2270	0.72	
WB	LT-TH-RT	1058	1864	0.57	0.73	1370	0.77	*
NB	LT	89	675	0.13	0.21	139	0.64	
NB	TH-RT	454	3150	0.14	0.21	646	0.70	
SB	LT	41	1535	0.00	0.00	149	0.28	
SB	TH-RT	486	3068	0.16	0.21	629	0.77	*

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.73 TOTAL V/C= 0.77

FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR 65 LEFT TURNS ON THE CHANGE INTERVAL AND 84 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH-RT	0.72	0.73	100.0	5.68	2270	0.80	0.85	5.51	B	11.5	11
WB	LT-TH-RT	0.77	0.73	100.0	6.18	1370	1.96	0.85	6.92	B	7.4	7
NB	LT	0.64	0.21	100.0	27.63	139	6.45	0.85	28.97	D	2.0	3
NB	TH-RT	0.70	0.21	100.0	28.04	646	2.37	0.85	25.85	D	9.5	10
SB	LT	0.28	0.21	100.0	25.45	149	0.27	1.00	25.72	D	1.1	2
SB	TH-RT	0.77	0.21	100.0	28.52	629	4.09	0.85	27.72	D	10.2	12

DIR	Delay	LOS
EB	5.51	B
WB	6.92	B
NB	26.36	D
SB	27.56	D

INTERSECTION DELAY = 12.00 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 25.4 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
MELNEA CASS/WASHINGTON
EXSITING CONDITIONS - SAT PEAK HOUR
date:08-17-1989 time:10:26:25
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I12S GEOMETRICS=P18I12 SIGNAL=P18I12
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	92	986	56	0	2	0	0.0	12.0	0.0	48
WB	52	666	15	0	2	0	0.0	12.0	0.0	48
NB	86	376	43	1	2	0	10.0	11.0	0.0	34
SB	36	303	101	1	2	0	10.0	11.0	0.0	34

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	25	N	16.0	3
WB	0.0%	2.0%	N	0	0	.950	25	N	16.0	3
NB	0.0%	5.0%	N	0	15	.950	25	N	12.5	3
SB	0.0%	5.0%	N	0	15	.950	25	N	12.5	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*									*				*	1.0	0	A
2	*	*	*		*	*	*					*				*	67.3	3	A
3				*				*					*	*	*		0.0	0	A
4				*				*	*	*	*		*	*	*		25.7	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	92	986	56	.950	97	1038	59
WB	52	666	15	.950	55	701	16
NB	86	376	43	.950	91	396	45
SB	36	303	101	.950	38	319	106

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	1194	2	1.05	1253	0.08	0.05
WB	LT-TH-RT	772	2	1.05	810	0.07	0.02
NB	LT	91	1	1.00	91	1.00	0.00
NB	TH-RT	441	2	1.05	463	0.00	0.10
SB	LT	38	1	1.00	38	1.00	0.00
SB	TH-RT	425	2	1.05	447	0.00	0.25

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	55	701	16	100	100	100	0	2	0	772
WESTBOUND	97	1038	59	99	99	99	0	2	0	1177
NORTHBOUND	38	319	106	0	100	100	1	2	0	425
SOUTHBOUND	91	396	45	100	100	100	1	2	0	441

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.992	0.931	3293
WB	LT-TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.997	0.615	2185
NB	LT	1800	1	0.933	0.976	1.000	1.000	1.000	1.000	1.000	0.488	800
NB	TH-RT	1800	2	0.967	0.976	1.000	1.000	0.969	1.000	0.983	1.000	3234

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SB  LT        1800  1 0.933 0.976 1.000 1.000 1.000 1.000 1.000 0.950 1557
SB  TH-RT     1800  2 0.967 0.976 1.000 1.000 0.969 1.000 0.960 1.000 3156

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB 100  67  2  772  772   55 0.07  2 1177 0.08
NB 100  26  1   91  441   91 1.00  2  425 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf      El    Fm   Flt
WB 3127 0.376 47.594 0.139 0.500 19.724 0.500  2.000   8.068 0.230 0.615
NB 3600 0.118 15.748 0.610 1.000  9.939 0.000  0.000   1.846 0.488 0.488

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT 1253 3293 0.38 0.68 2249 0.56     *
WB  LT-TH-RT  810 2185 0.37 0.67 1471 0.55
NB  LT         91  800 0.11 0.26  205 0.44
NB  TH-RT     463 3234 0.14 0.26  831 0.56     *
SB  LT         38 1557 0.00 0.00  200 0.19     *
SB  TH-RT     447 3156 0.14 0.26  812 0.55

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.52 TOTAL V/C= 0.56
FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 66 LEFT TURNS ON THE CHANGE INTERVAL AND  134 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.56 0.68 100.0   6.17 2249    0.24 0.85    5.45  B  10.5   11
WB  LT-TH-RT 0.55 0.67 100.0   6.45 1471    0.35 0.85    5.78  B   7.0    7
NB  LT       0.44 0.26 100.0  23.66  205    1.00 0.85   20.97  C   1.9    2
NB  TH-RT    0.56 0.26 100.0  24.49  831    0.64 0.85   21.36  C   9.1    9
SB  LT       0.19 0.26 100.0  22.04  200    0.06 1.00   22.10  C   1.1    1
SB  TH-RT    0.55 0.26 100.0  24.42  812    0.62 0.85   21.29  C   8.8    9

DIR Delay LOS
EB   5.45  B
WB   5.78  B
NB  21.30  C
SB  21.35  C
INTERSECTION DELAY = 10.85 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  13.4 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is   0.9 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  67.4 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is   0.0 secs green,   0.0 secs yellow + red clear
suggested timing phase 4 is  25.7 secs green,   3.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
MELNEA CASS/MASSACHUSETTS/SOUTHHAMPTON/X-WAY RAMPS
EXISTING CONDITIONS - AM PEAK HOUR
date:08-13-1989 time:04:26:47
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I13AM GEOMETRICS=P18I13 SIGNAL=P18I13
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	412	385	1	2	2	0	11.0	12.0	0.0	0
WB	404	843	0	1	3	0	12.0	12.0	0.0	0
NB	11	506	294	1	3	0	11.0	12.0	0.0	0
SB	242	621	837	1	2	2	10.0	12.0	10.0	0

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT MIN TIME	TYPE
EB	0.0%	3.0%	N	0	0	.920	0	N 4.0	3
WB	0.0%	13.0%	N	0	0	.920	0	N 4.0	3
NB	0.0%	10.0%	N	0	0	.920	0	N 4.0	3
SB	0.0%	10.0%	N	0	0	.920	0	N 4.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*				*							*			*		30.2	0	A
2		*	*			*	*					*				*	21.9	3	A
3				*				*	*				*		*		19.1	0	A
4				*				*		*	*			*	*		22.8	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	412	385	1	.920	448	418	1
WB	404	843	0	.920	439	916	0
NB	11	506	294	.920	12	550	320
SB	242	621	837	.920	263	675	910

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	448	2	1.05	470	1.00	0.00
EB	TH-RT	420	2	1.05	441	0.00	0.00
WB	LT	439	1	1.00	439	1.00	0.00
WB	TH	916	3	1.10	1008	0.00	0.00
NB	LT	12	1	1.00	12	1.00	0.00
NB	TH-RT	870	3	1.10	957	0.00	0.37
SB	LT	263	1	1.00	263	1.00	0.00
SB	TH	675	2	1.05	709	0.00	0.00
SB	RT	910	2	1.05	955	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	439	916	0	100	0	0	1	3	0	0

WESTBOUND	448	418	1	100	0	0	2	2	0	0
NORTHBOUND	263	675	910	100	0	0	1	2	2	0
SOUTHBOUND	12	550	320	100	0	0	1	3	0	0

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	2	0.967	0.985	1.000	1.000	1.000	1.000	1.000	0.920	3154
EB	TH-RT	1800	2	1.000	0.985	1.000	1.000	1.000	1.000	1.000	1.000	3545
WB	LT	1800	1	1.000	0.939	1.000	1.000	1.000	1.000	1.000	0.950	1606
WB	TH	1800	3	1.000	0.939	1.000	1.000	1.000	1.000	1.000	1.000	5070
NB	LT	1800	1	0.967	0.952	1.000	1.000	1.000	1.000	1.000	0.950	1574
NB	TH-RT	1800	3	1.000	0.952	1.000	1.000	1.000	1.000	0.945	1.000	4859
SB	LT	1800	1	0.933	0.952	1.000	1.000	1.000	1.000	1.000	0.950	1520
SB	TH	1800	2	1.000	0.952	1.000	1.000	1.000	1.000	1.000	1.000	3429
SB	RT	1800	2	0.933	0.952	1.000	1.000	1.000	1.000	0.750	1.000	2400

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT	470	3154	0.15	0.30	952	0.49	
EB	TH-RT	441	3545	0.12	0.22	778	0.57	
WB	LT	439	1606	0.27	0.30	484	0.91	*
WB	TH	1008	5070	0.20	0.22	1112	0.91	*
NB	LT	12	1574	0.01	0.19	301	0.04	
NB	TH-RT	957	4859	0.20	0.23	1108	0.86	
SB	LT	263	1520	0.17	0.19	290	0.91	*
SB	TH	709	3429	0.21	0.23	782	0.91	*
SB	RT	955	2400	0.40	0.72	1730	0.55	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.85 TOTAL V/C= 0.91

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.49	0.30	100.0	21.77	952	0.34	1.00	22.12	C	8.7	9
EB	TH-RT	0.57	0.22	100.0	26.45	778	0.74	0.85	23.11	C	9.1	9
WB	LT	0.91	0.30	100.0	25.50	484	14.66	1.00	40.16	E	9.2	16
WB	TH	0.91	0.22	100.0	28.91	1112	7.69	0.85	31.10	D	19.9	25
NB	LT	0.04	0.19	100.0	25.07	301	0.00	1.00	25.07	D	0.3	1
NB	TH-RT	0.86	0.23	100.0	28.19	1108	5.12	0.85	28.32	D	18.6	21
SB	LT	0.91	0.19	100.0	30.08	290	21.15	1.00	51.23	E	6.7	12
SB	TH	0.91	0.23	100.0	28.54	782	10.19	0.85	32.92	D	14.5	19
SB	RT	0.55	0.72	100.0	4.92	1730	0.30	0.85	4.44	A	7.1	7

DIR	Delay	LOS
EB	22.60	C
WB	33.85	D
NB	28.28	D
SB	21.30	C

INTERSECTION DELAY = 26.27 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 58.2 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
MELNEA CASS/MASSACHUSETTS/SOUTHHAMPTON/X-WAY RAMPS
EXISTING CONDITIONS - PM PEAK HOUR
date:08-13-1989 time:04:33:07
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I13PM GEOMETRICS=P18I13 SIGNAL=P18I13
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	676	353	2	2	2	0	11.0	12.0	0.0	0
WB	323	385	0	1	3	0	12.0	12.0	0.0	0
NB	18	562	337	1	3	0	11.0	12.0	0.0	0
SB	181	749	597	1	2	2	10.0	12.0	10.0	0

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	N	0	0	.930	0	N	4.0	3
WB	0.0%	13.0%	N	0	0	.930	0	N	4.0	3
NB	0.0%	10.0%	N	0	0	.930	0	N	4.0	3
SB	0.0%	10.0%	N	0	0	.930	0	N	4.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*				*							*			*		31.2	0	A
2		*	*			*	*					*				*	14.6	3	A
3				*				*	*				*		*		16.5	0	A
4				*				*		*	*			*	*		31.8	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	676	353	2	.930	727	380	2
WB	323	385	0	.930	347	414	0
NB	18	562	337	.930	19	604	362
SB	181	749	597	.930	195	805	642

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	727	2	1.05	763	1.00	0.00
EB	TH-RT	382	2	1.05	401	0.00	0.01
WB	LT	347	1	1.00	347	1.00	0.00
WB	TH	414	3	1.10	455	0.00	0.00
NB	LT	19	1	1.00	19	1.00	0.00
NB	TH-RT	967	3	1.10	1063	0.00	0.37
SB	LT	195	1	1.00	195	1.00	0.00
SB	TH	805	2	1.05	846	0.00	0.00
SB	RT	642	2	1.05	674	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	347	414	0	100	0	0	1	3	0	0

WESTBOUND	727	380	2	100	0	0	2	2	0	0
NORTHBOUND	195	805	642	100	0	0	1	2	2	0
SOUTHBOUND	19	604	362	100	0	0	1	3	0	0

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	2	0.967	0.985	1.000	1.000	1.000	1.000	1.000	0.920	3154
EB	TH-RT	1800	2	1.000	0.985	1.000	1.000	1.000	1.000	0.999	1.000	3544
WB	LT	1800	1	1.000	0.939	1.000	1.000	1.000	1.000	1.000	0.950	1606
WB	TH	1800	3	1.000	0.939	1.000	1.000	1.000	1.000	1.000	1.000	5070
NB	LT	1800	1	0.967	0.952	1.000	1.000	1.000	1.000	1.000	0.950	1574
NB	TH-RT	1800	3	1.000	0.952	1.000	1.000	1.000	1.000	0.944	1.000	4854
SB	LT	1800	1	0.933	0.952	1.000	1.000	1.000	1.000	1.000	0.950	1520
SB	TH	1800	2	1.000	0.952	1.000	1.000	1.000	1.000	1.000	1.000	3429
SB	RT	1800	2	0.933	0.952	1.000	1.000	1.000	1.000	0.750	1.000	2400

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT	763	3154	0.24	0.31	983	0.78	*
EB	TH-RT	401	3544	0.11	0.15	516	0.78	*
WB	LT	347	1606	0.22	0.31	500	0.69	
WB	TH	455	5070	0.09	0.15	739	0.62	
NB	LT	19	1574	0.01	0.16	260	0.07	
NB	TH-RT	1063	4854	0.22	0.32	1542	0.69	
SB	LT	195	1520	0.13	0.16	251	0.78	*
SB	TH	846	3429	0.25	0.32	1089	0.78	*
SB	RT	674	2400	0.28	0.79	1906	0.35	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.73 TOTAL V/C= 0.78

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.78	0.31	100.0	23.75	983	2.78	1.00	26.53	D	13.9	17
EB	TH-RT	0.78	0.15	100.0	31.27	516	5.06	0.85	30.88	D	9.1	11
WB	LT	0.69	0.31	100.0	22.97	500	2.86	1.00	25.83	D	6.6	8
WB	TH	0.62	0.15	100.0	30.47	739	1.12	0.85	26.85	D	9.8	10
NB	LT	0.07	0.16	100.0	26.83	260	0.00	1.00	26.83	D	0.4	1
NB	TH-RT	0.69	0.32	100.0	22.65	1542	0.93	0.85	20.05	C	18.3	18
SB	LT	0.78	0.16	100.0	30.39	251	9.58	1.00	39.97	D	4.5	7
SB	TH	0.78	0.32	100.0	23.48	1089	2.52	0.85	22.10	C	15.3	16
SB	RT	0.35	0.79	100.0	2.24	1906	0.05	0.85	1.94	A	3.7	4

DIR	Delay	LOS
EB	28.03	D
WB	26.41	D
NB	20.17	C
SB	16.20	C

INTERSECTION DELAY = 21.71 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 25.9 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
MELNEA CASS/MASSACHUSETTS/SOUTHHAMPTON/X-WAY RAMPS
EXISTING CONDITIONS - SAT PEAK HOUR
date:08-17-1989 time:11:19:27
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=P18I13S GEOMETRICS=P18I13 SIGNAL=P18I13
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	507	264	2	2	2	0	11.0	12.0	0.0	0
WB	242	289	0	1	3	0	12.0	12.0	0.0	0
NB	14	422	253	1	3	0	11.0	12.0	0.0	0
SB	136	562	434	1	2	2	10.0	12.0	10.0	0

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.920	0	N	4.0	3
WB	0.0%	5.0%	N	0	0	.920	0	N	4.0	3
NB	0.0%	2.0%	N	0	0	.920	0	N	4.0	3
SB	0.0%	2.0%	N	0	0	.920	0	N	4.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*				*							*			*		31.7	0	A
2		*	*			*	*					*				*	14.8	3	A
3				*				*	*				*		*		16.2	0	A
4				*				*		*	*			*	*		31.2	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	507	264	2	.920	551	287	2
WB	242	289	0	.920	263	314	0
NB	14	422	253	.920	15	459	275
SB	136	562	434	.920	148	611	472

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	551	2	1.05	579	1.00	0.00
EB	TH-RT	289	2	1.05	304	0.00	0.01
WB	LT	263	1	1.00	263	1.00	0.00
WB	TH	314	3	1.10	346	0.00	0.00
NB	LT	15	1	1.00	15	1.00	0.00
NB	TH-RT	734	3	1.10	807	0.00	0.37
SB	LT	148	1	1.00	148	1.00	0.00
SB	TH	611	2	1.05	641	0.00	0.00
SB	RT	472	2	1.05	495	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	263	314	0	100	0	0	1	3	0	0
WESTBOUND	551	287	2	100	0	0	2	2	0	0

NORTHBOUND	148	611	472	100	0	0	1	2	2	0	
SOUTHBOUND	15	459	275	100	0	0	1	3	0	0	

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.920	3170
EB	TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.999	1.000	3560
WB	LT	1800	1	1.000	0.976	1.000	1.000	1.000	1.000	1.000	0.950	1668
WB	TH	1800	3	1.000	0.976	1.000	1.000	1.000	1.000	1.000	1.000	5268
NB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1637
NB	TH-RT	1800	3	1.000	0.990	1.000	1.000	1.000	1.000	0.944	1.000	5046
SB	LT	1800	1	0.933	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1580
SB	TH	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3564
SB	RT	1800	2	0.933	0.990	1.000	1.000	1.000	1.000	0.750	1.000	2495

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT	579	3170	0.18	0.32	1005	0.58	*
EB	TH-RT	304	3560	0.09	0.15	527	0.58	*
WB	LT	263	1668	0.16	0.32	529	0.50	
WB	TH	346	5268	0.07	0.15	780	0.44	
NB	LT	15	1637	0.01	0.16	266	0.06	
NB	TH-RT	807	5046	0.16	0.31	1577	0.51	
SB	LT	148	1580	0.09	0.16	257	0.58	*
SB	TH	641	3564	0.18	0.31	1114	0.58	*
SB	RT	495	2495	0.20	0.79	1976	0.25	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.54 TOTAL V/C= 0.58

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.58	0.32	100.0	21.69	1005	0.61	1.00	22.30	C	10.5	11
EB	TH-RT	0.58	0.15	100.0	30.15	527	1.15	0.85	26.61	D	6.8	7
WB	LT	0.50	0.32	100.0	21.05	529	0.63	1.00	21.68	C	5.0	6
WB	TH	0.44	0.15	100.0	29.52	780	0.27	0.85	25.32	D	7.4	8
NB	LT	0.06	0.16	100.0	26.91	266	0.00	1.00	26.91	D	0.4	1
NB	TH-RT	0.51	0.31	100.0	21.38	1577	0.24	0.85	18.38	C	14.0	14
SB	LT	0.58	0.16	100.0	29.41	257	2.32	1.00	31.72	D	3.4	5
SB	TH	0.58	0.31	100.0	21.90	1114	0.55	0.85	19.09	C	11.7	12
SB	RT	0.25	0.79	100.0	2.05	1976	0.01	0.85	1.76	A	2.7	3

DIR	Delay	LOS
EB	23.78	C
WB	23.75	C
NB	18.54	C
SB	13.86	B

INTERSECTION DELAY = 19.03 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 13.9 SECONDS
THE EXISTING TIMING IS OPTIMAL

Level of Service Calculations:

No Build (1996) Conditions
(AM, PM and SAT peak hours)

- Tremont/Ruggles/Whittier
- Tremont/Melnea Cass
- Ruggles/Busway
- Tremont/Prentiss
- Huntington/Ruggles
- Tremont/Columbus/New Dudley
- Parker/Ruggles
- Melnea Cass/Columbus/Busway
- Melnea Cass/Washington
- Melnea Cass/Massachusetts/Southampton/
  Expressway Ramps

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/RUGGLES/WHITTIER
NO BUILD CONDITIONS - AM PEAK HOUR
date:08-15-1989 time:09:29:15
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I1NBAM GEOMETRICS=P18I1M SIGNAL=P18I1M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	702	0	307	2	0	1	11.0	0.0	15.0	50
WB	40	36	24	0	1	0	0.0	12.0	0.0	24
NB	478	1495	0	1	3	0	11.0	11.0	0.0	42
SB	0	898	902	0	2	1	0.0	11.0	15.0	42

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	-2.0%	2.0%	N	0	0	.960	50	N	16.5	3
WB	0.0%	2.0%	Y	2	0	.960	50	N	16.5	3
NB	0.0%	2.0%	N	0	0	.960	50	N	14.5	3
SB	0.0%	2.0%	N	0	0	.960	100	N	14.5	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*						*	25.1	0	A
2				*				*	*	*				*	*		35.3	3	A
3	*		*					*				*			*		23.7	0	A
4	*		*		*	*	*					*				*	9.9	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	702	0	307	.960	731	0	320
WB	40	36	24	.960	42	38	25
NB	478	1495	0	.960	498	1557	0
SB	0	898	902	.960	0	935	940

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	731	2	1.05	768	1.00	0.00
EB	RT	320	1	1.00	320	0.00	1.00
WB	LT-TH-RT	104	1	1.00	104	0.40	0.24
NB	LT	498	1	1.00	498	1.00	0.00
NB	TH	1557	3	1.10	1713	0.00	0.00
SB	TH	935	2	1.05	982	0.00	0.00
SB	RT	940	1	1.00	940	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	42	38	25	100	100	100	0	1	0	63
WESTBOUND	731	0	320	0	0	0	2	0	1	0
NORTHBOUND	0	935	940	100	100	0	0	2	1	935

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	2	0.967	0.990	1.010	1.000	1.000	1.000	1.000	0.920	3202
EB	RT	1800	1	1.100	0.990	1.010	1.000	1.000	1.000	0.836	1.000	1656
WB	LT-TH-RT	1800	1	1.000	0.990	1.000	0.890	1.000	1.000	0.856	0.836	1136

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NB  LT        1800  1 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.950 1637
NB  TH        1800  3 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 5168
SB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3446
SB  RT        1800  1 1.100 0.990 1.000 1.000 1.000 1.000 0.836 1.000 1638

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT        768 3202 0.19 0.24  904 0.81
EB  RT        320 1656 0.19 0.59  973 0.33
WB  LT-TH-RT  104 1136 0.09 0.10  113 0.93     *
NB  LT        498 1637 0.23 0.25  535 0.93     *
NB  TH       1713 5168 0.33 0.60 3119 0.55
SB  TH        982 3446 0.29 0.35 1215 0.81
SB  RT        940 1638 0.57 0.59  967 0.97     *

CYCLE=100.0  LOST= 3.0  SUM V/S CRIT= 0.90 TOTAL V/C= 0.93
FOR THE EASTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 70 LEFT TURNS ON THE CHANGE INTERVAL AND  75 ON THE PERMISSIVE PHASE
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  56 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT       0.81 0.34 100.0  22.98  904    3.88 1.00   26.86  D  15.5   17
EB  RT       0.33 0.59 100.0   8.01  973    0.08 0.85    6.88  B   3.7    4
WB  LT-TH-RT 0.93 0.10 100.0  33.95  113   43.70 0.85   66.01  F   3.2    7
NB  LT       0.93 0.60 100.0  13.62  535   16.63 1.00   30.25  D  10.4   13
NB  TH       0.55 0.60 100.0   8.94 3119    0.16 0.85    7.74  B  17.2   17
SB  TH       0.81 0.35 100.0  22.28 1215    2.95 0.85   21.45  C  16.8   18
SB  RT       0.97 0.59 100.0  14.98  967   16.67 0.85   26.90  D  12.4   22

DIR Delay LOS
EB  20.98  C
WB  66.01  F
NB  12.81  B
SB  24.11  C
INTERSECTION DELAY = 19.60 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  55.4 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  25.2 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  35.2 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  23.7 secs green,   0.0 secs yellow + red clear
suggested timing phase 4 is   9.9 secs green,   3.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/RUGGLES/WHITTIER
NO BUILD CONDITIONS - PM PEAK HOUR
date:08-15-1989 time:09:34:35
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I1NBPM GEOMETRICS=P18I1M SIGNAL=P18I1M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	911	0	345	2	0	1	11.0	0.0	15.0	50
WB	40	20	26	0	1	0	0.0	10.0	0.0	24
NB	370	1183	0	1	3	0	11.0	11.0	0.0	42
SB	0	1365	1049	0	2	1	0.0	11.0	15.0	42

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	-2.0%	2.0%	N	0	0	.940	50	N	16.5	3
WB	0.0%	2.0%	Y	0	0	.940	50	N	16.5	3
NB	0.0%	2.0%	N	0	0	.940	50	N	14.5	3
SB	0.0%	2.0%	N	0	0	.940	100	N	14.5	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*						*	18.9	0	A
2				*				*	*	*				*	*		42.4	3	A
3	*		*					*				*			*		25.1	0	A
4	*		*		*	*	*					*				*	7.6	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	911	0	345	.940	969	0	367
WB	40	20	26	.940	43	21	28
NB	370	1183	0	.940	394	1259	0
SB	0	1365	1049	.940	0	1452	1116

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	969	2	1.05	1018	1.00	0.00
EB	RT	367	1	1.00	367	0.00	1.00
WB	LT-TH-RT	91	1	1.00	91	0.47	0.30
NB	LT	394	1	1.00	394	1.00	0.00
NB	TH	1259	3	1.10	1384	0.00	0.00
SB	TH	1452	2	1.05	1525	0.00	0.00
SB	RT	1116	1	1.00	1116	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	43	21	28	100	100	100	0	1	0	49
WESTBOUND	969	0	367	0	0	0	2	0	1	0
NORTHBOUND	0	1452	1116	100	100	0	0	2	1	1399

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	2	0.967	0.990	1.010	1.000	1.000	1.000	1.000	0.920	3202
EB	RT	1800	1	1.100	0.990	1.010	1.000	1.000	1.000	0.835	1.000	1653
WB	LT-TH-RT	1800	1	0.933	0.990	1.000	1.000	1.000	1.000	0.845	0.826	1161

```
NB  LT        1800  1 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.950 1637
NB  TH        1800  3 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 5168
SB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3446
SB  RT        1800  1 1.100 0.990 1.000 1.000 1.000 1.000 0.835 1.000 1637

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT       1018 3202 0.26 0.25  927 1.05     *
EB  RT        367 1653 0.22 0.52  852 0.43
WB  LT-TH-RT   91 1161 0.08 0.08   88 1.04     *
NB  LT        394 1637 0.20 0.19  378 1.04     *
NB  TH       1384 5168 0.27 0.61 3169 0.44
SB  TH       1525 3446 0.44 0.42 1462 1.04     *
SB  RT       1116 1637 0.68 0.68 1106 1.01

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.98 TOTAL V/C= 1.04
FOR THE EASTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 70 LEFT TURNS ON THE CHANGE INTERVAL AND  53 ON THE PERMISSIVE PHASE
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  0 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2    PF   Delay LOS Avg Q  95% Q
EB  LT       1.05 0.33 100.0  26.16  927   35.40 1.00   61.55  F  26.6   51
EB  RT       0.43 0.52 100.0  11.46  852    0.23 0.85    9.93  B   4.9    5
WB  LT-TH-RT 1.04 0.08 100.0  35.25   88   90.51 0.85  106.90  F   3.9    9
NB  LT       1.04 0.61 100.0  15.74  378   47.95 1.00   63.68  F  11.4   22
NB  TH       0.44 0.61 100.0   7.77 3169    0.06 0.85    6.66  B  13.5   14
SB  TH       1.04 0.42 100.0  22.59 1462   29.72 0.85   44.46  E  29.5   55
SB  RT       1.01 0.68 100.0  12.56 1106   22.91 0.85   30.15  D  14.4   29

DIR Delay LOS
EB  47.87  E
WB 106.90  F
NB  19.28  C
SB  38.42  D
INTERSECTION DELAY = 35.93 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
for chosen cycle length 100.0
suggested timing phase 1 is  18.8 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  42.4 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  25.2 secs green,   0.0 secs yellow + red clear
suggested timing phase 4 is   7.6 secs green,   3.0 secs yellow + red clear
```

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/RUGGLES/WHITTIER
NO BUILD CONDITIONS - SAT PEAK HOUR
date:08-15-1989 time:09:39:17
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I1NBSAT GEOMETRICS=P18I1M SIGNAL=P18I1M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	622	0	288	2	0	1	11.0	0.0	15.0	50
WB	16	14	17	0	1	0	0.0	10.0	0.0	24
NB	290	1076	0	1	3	0	11.0	11.0	0.0	42
SB	0	1191	400	0	2	1	0.0	11.0	15.0	42

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	-2.0%	2.0%	N	0	0	.920	50	N	16.5	3
WB	0.0%	2.0%	Y	2	0	.920	50	N	16.5	3
NB	0.0%	2.0%	N	0	0	.920	50	N	14.5	3
SB	0.0%	2.0%	N	0	0	.920	50	N	14.5	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*						*	18.1	0	A
2				*				*	*	*				*	*		48.1	3	A
3	*		*					*				*			*		22.0	0	A
4	*		*		*	*	*					*				*	5.9	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	622	0	288	.920	676	0	313
WB	16	14	17	.920	17	15	18
NB	290	1076	0	.920	315	1170	0
SB	0	1191	400	.920	0	1295	435

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	676	2	1.05	710	1.00	0.00
EB	RT	313	1	1.00	313	0.00	1.00
WB	LT-TH-RT	51	1	1.00	51	0.34	0.36
NB	LT	315	1	1.00	315	1.00	0.00
NB	TH	1170	3	1.10	1287	0.00	0.00
SB	TH	1295	2	1.05	1359	0.00	0.00
SB	RT	435	1	1.00	435	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	17	15	18	100	100	100	0	1	0	34
WESTBOUND	676	0	313	0	0	0	2	0	1	0
NORTHBOUND	0	1295	435	100	100	0	0	2	1	1295

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	2	0.967	0.990	1.010	1.000	1.000	1.000	1.000	0.920	3202
EB	RT	1800	1	1.100	0.990	1.010	1.000	1.000	1.000	0.836	1.000	1654
WB	LT-TH-RT	1800	1	0.933	0.990	1.000	0.890	1.000	1.000	0.843	0.846	1055

NB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1637
NB	TH	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	1.000	1.000	5168
SB	TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3446
SB	RT	1800	1	1.100	0.990	1.000	1.000	1.000	1.000	0.834	1.000	1634

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT	710	3202	0.18	0.22	822	0.82	*
EB	RT	313	1654	0.19	0.46	760	0.41	
WB	LT-TH-RT	51	1055	0.05	0.06	62	0.82	*
NB	LT	315	1637	0.15	0.18	384	0.82	*
NB	TH	1287	5168	0.25	0.66	3418	0.38	
SB	TH	1359	3446	0.39	0.48	1656	0.82	*
SB	RT	435	1634	0.27	0.70	1144	0.38	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.77 TOTAL V/C= 0.82
FOR THE EASTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
70 LEFT TURNS ON THE CHANGE INTERVAL AND 49 ON THE PERMISSIVE PHASE
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
69 LEFT TURNS ON THE CHANGE INTERVAL AND 19 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.82	0.28	100.0	25.66	822	4.76	1.00	30.41	D	14.7	18
EB	RT	0.41	0.46	100.0	13.70	760	0.21	0.85	11.82	B	4.7	5
WB	LT-TH-RT	0.82	0.06	100.0	35.36	62	36.61	0.85	61.18	F	1.5	3
NB	LT	0.82	0.66	100.0	9.54	384	9.15	1.00	18.69	C	7.2	7
NB	TH	0.38	0.66	100.0	5.80	3418	0.03	0.85	4.96	A	11.0	11
SB	TH	0.82	0.48	100.0	16.93	1656	2.44	0.85	16.47	C	18.7	19
SB	RT	0.38	0.70	100.0	4.65	1144	0.11	0.85	4.05	A	3.6	4

DIR	Delay	LOS
EB	24.72	C
WB	61.18	F
NB	7.66	B
SB	13.46	B

INTERSECTION DELAY = 14.50 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 32.0 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 18.1 secs green, 0.0 secs yellow + red clear
suggested timing phase 2 is 48.0 secs green, 3.0 secs yellow + red clear
suggested timing phase 3 is 22.0 secs green, 0.0 secs yellow + red clear
suggested timing phase 4 is 5.9 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
NO BUILD CONDITIONS - AM PEAK HOUR
date:08-15-1989 time:08:05:22
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2NBAM GEOMETRICS=P18INT2 SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	5	72	254	0	1	1	0.0	11.0	11.0	44
WB	0	1447	68	0	3	0	0.0	11.0	0.0	49
NB	583	923	0	0	2	0	0.0	13.0	0.0	56
SB	62	498	1	0	2	0	0.0	14.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	50	N 16.3	3
WB	0.0%	2.0%	N	0	0	.950	50	N 16.3	3
NB	0.0%	2.0%	N	0	0	.950	50	N 15.0	3
SB	0.0%	2.0%	N	0	0	.950	50	N 15.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							12.6	0	A
2				*				*	*	*			*	*	*		40.7	3	A
3						*	*					*				*	32.7	3	A
4	*	*	*									*				*	5.0	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	5	72	254	.950	5	76	267
WB	0	1447	68	.950	0	1523	72
NB	583	923	0	.950	614	972	0
SB	62	498	1	.950	65	524	1

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	81	1	1.00	81	0.06	0.00
EB	RT	267	1	1.00	267	0.00	1.00
WB	TH-RT	1595	3	1.10	1754	0.00	0.04
NB	LT-TH	1585	2	1.05	1665	0.39	0.00
SB	LT-TH-RT	591	2	1.05	620	0.11	0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	1523	72	0	0	0	0	3	0	0
NORTHBOUND	65	524	1	100	100	100	0	2	0	591
SOUTHBOUND	614	972	0	76	76	0	0	2	0	1212

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.890	1533
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.843	1.000	1453
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.992	1.000	5128
NB	LT-TH	1800	2	1.033	0.990	1.000	1.000	1.000	1.000	1.000	0.810	2982
SB	LT-TH-RT	1800	2	1.067	0.990	1.000	1.000	1.000	1.000	1.000	0.549	2087

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
SB	100	41	2	591	591	65	0.11	2	1212	0.39

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
SB	2443	0.496	0.000	0.118	1.000	40.731	0.000	0.000	9.554	0.098	0.549

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH	81	1533	0.05	0.05	77	1.05	*
EB	RT	267	1453	0.18	0.18	256	1.05	
WB	TH-RT	1754	5128	0.34	0.33	1675	1.05	*
NB	LT-TH	1665	2982	0.56	0.53	1589	1.05	*
SB	LT-TH-RT	620	2087	0.30	0.41	850	0.73	

CYCLE=100.0 LOST= 9.0 SUM V/S CRIT= 0.95 TOTAL V/C= 1.05

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH	1.05	0.05	100.0	36.17	77	97.81	0.85	113.88	F	3.6	9
EB	RT	1.05	0.18	100.0	31.61	256	57.61	0.85	75.84	F	8.7	18
WB	TH-RT	1.05	0.33	100.0	26.19	1675	30.03	0.85	47.79	E	36.1	64
NB	LT-TH	1.05	0.53	100.0	18.76	1589	30.49	0.85	41.86	E	28.7	56
SB	LT-TH-RT	0.73	0.41	100.0	18.99	850	2.23	0.85	18.04	C	9.7	10

DIR	Delay	LOS
EB	84.69	F
WB	47.79	E
NB	41.86	E
SB	18.04	C

INTERSECTION DELAY = 44.27 INTERSECTION LOS=E

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
for chosen cycle length 100.0
suggested timing phase 1 is 12.5 secs green, 0.0 secs yellow + red clear
suggested timing phase 2 is 40.8 secs green, 3.0 secs yellow + red clear
suggested timing phase 3 is 32.7 secs green, 3.0 secs yellow + red clear
suggested timing phase 4 is 5.0 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
NO BUILD CONDITIONS - PM PEAK HOUR
date:08-15-1989 time:08:11:58
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2NBPM GEOMETRICS=P18INT2 SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	249	563	0	1	1	0.0	11.0	11.0	44
WB	0	1581	51	0	3	0	0.0	11.0	0.0	49
NB	398	686	0	0	2	0	0.0	13.0	0.0	56
SB	81	611	17	0	2	0	0.0	14.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.930	50	N	16.3	3
WB	0.0%	2.0%	N	0	0	.930	50	N	16.3	3
NB	0.0%	2.0%	N	0	0	.930	50	N	15.0	3
SB	0.0%	2.0%	N	0	0	.930	50	N	15.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							9.2	0	A
2				*				*	*	*			*	*	*		29.9	3	A
3						*	*					*				*	30.2	3	A
4	*	*	*									*				*	21.7	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	249	563	.930	0	268	605
WB	0	1581	51	.930	0	1700	55
NB	398	686	0	.930	428	738	0
SB	81	611	17	.930	87	657	18

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	268	1	1.00	268	0.00	0.00
EB	RT	605	1	1.00	605	0.00	1.00
WB	TH-RT	1755	3	1.10	1930	0.00	0.03
NB	LT-TH	1166	2	1.05	1224	0.37	0.00
SB	LT-TH-RT	762	2	1.05	800	0.11	0.02

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
NORTHBOUND	87	657	18	100	100	100	0	2	0	762
SOUTHBOUND	428	738	0	76	76	0	0	2	0	892

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	1.000	1723
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.833	1.000	1436
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.995	1.000	5140
NB	LT-TH	1800	2	1.033	0.990	1.000	1.000	1.000	1.000	1.000	0.754	2777
SB	LT-TH-RT	1800	2	1.067	0.990	1.000	1.000	1.000	1.000	0.996	0.567	2148

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
SB	100	30	2	762	762	87	0.11	2	892	0.37

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
SB	2157	0.413	0.000	0.318	0.874	29.937	0.126	0.288	3.541	0.135	0.567

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	268	1723	0.16	0.22	374	0.72	
EB	RT	605	1436	0.42	0.31	443	1.37	*
WB	TH-RT	1930	5140	0.38	0.30	1551	1.24	*
NB	LT-TH	1224	2777	0.44	0.39	1087	1.13	
SB	LT-TH-RT	800	2148	0.37	0.30	643	1.24	*

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 1.17 TOTAL V/C= 1.24

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.72	0.22	100.0	27.59	374	4.42	0.85	27.21	D	5.8	7
EB	RT	1.37	0.31	100.0	31.39	443	255.68	0.85	244.01	F	46.8	124
WB	TH-RT	1.24	0.30	100.0	29.67	1551	137.68	0.85	142.25	F	86.4	209
NB	LT-TH	1.13	0.39	100.0	25.17	1087	67.19	0.85	78.50	F	35.3	77
SB	LT-TH-RT	1.24	0.30	100.0	29.73	643	146.33	0.85	149.65	F	39.1	96

DIR	Delay	LOS
EB	177.53	F
WB	142.25	F
NB	78.50	F
SB	149.65	F

INTERSECTION DELAY =133.70 INTERSECTION LOS=F

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
NO BUILD CONDITIONS - SAT PEAK HOUR
date:08-15-1989 time:08:19:42
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2NBSAT GEOMETRICS=P18INT2 SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	7	77	351	0	1	1	0.0	11.0	11.0	44
WB	0	918	118	0	3	0	0.0	11.0	0.0	49
NB	283	880	0	0	2	0	0.0	13.0	0.0	56
SB	92	576	28	0	2	0	0.0	14.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	25	N	16.3	3
WB	0.0%	2.0%	N	0	0	.950	25	N	16.3	3
NB	0.0%	2.0%	N	0	0	.950	25	N	15.0	3
SB	0.0%	2.0%	N	0	0	.950	25	N	15.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							9.3	0	A
2				*				*	*	*			*	*	*		40.2	3	A
3						*	*					*				*	25.9	3	A
4	*	*	*									*				*	15.6	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	7	77	351	.950	7	81	369
WB	0	918	118	.950	0	966	124
NB	283	880	0	.950	298	926	0
SB	92	576	28	.950	97	606	29

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	88	1	1.00	88	0.08	0.00
EB	RT	369	1	1.00	369	0.00	1.00
WB	TH-RT	1091	3	1.10	1200	0.00	0.11
NB	LT-TH	1224	2	1.05	1285	0.24	0.00
SB	LT-TH-RT	733	2	1.05	769	0.13	0.04

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	966	124	0	0	0	0	3	0	0
NORTHBOUND	97	606	29	100	100	100	0	2	0	733
SOUTHBOUND	298	926	0	81	81	0	0	2	0	994

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.888	1529
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.843	1.000	1451
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.982	1.000	5073
NB	LT-TH	1800	2	1.033	0.990	1.000	1.000	1.000	1.000	1.000	0.832	3064
SB	LT-TH-RT	1800	2	1.067	0.990	1.000	1.000	1.000	1.000	0.993	0.555	2096

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
SB	100	40	2	733	733	97	0.13	2	994	0.24

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
SB	2548	0.390	1.868	0.253	1.000	38.299	0.000	0.000	4.439	0.110	0.555

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH	88	1529	0.06	0.16	239	0.37	
EB	RT	369	1451	0.25	0.25	361	1.02	*
WB	TH-RT	1200	5073	0.24	0.26	1315	0.91	*
NB	LT-TH	1285	3064	0.42	0.49	1515	0.85	
SB	LT-TH-RT	769	2096	0.37	0.40	842	0.91	*

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.86 TOTAL V/C= 0.91

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH	0.37	0.16	100.0	28.71	239	0.46	0.85	24.80	C	2.1	3
EB	RT	1.02	0.25	100.0	28.75	361	42.70	0.85	60.73	F	10.1	20
WB	TH-RT	0.91	0.26	100.0	27.30	1315	7.09	0.85	29.23	D	22.4	27
NB	LT-TH	0.85	0.49	100.0	16.72	1515	3.37	0.85	17.08	C	17.2	18
SB	LT-TH-RT	0.91	0.40	100.0	21.48	842	10.26	0.85	26.98	D	12.2	17

DIR	Delay	LOS
EB	53.79	E
WB	29.23	D
NB	17.08	C
SB	26.98	D

INTERSECTION DELAY = 27.59 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 61.9 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 9.3 secs green, 0.0 secs yellow + red clear
suggested timing phase 2 is 40.2 secs green, 3.0 secs yellow + red clear
suggested timing phase 3 is 25.9 secs green, 3.0 secs yellow + red clear
suggested timing phase 4 is 15.6 secs green, 3.0 secs yellow + red clear

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
RUGGLES STREET/BUSWAY (OUTBOUND)
NO BUILD CONDITIONS: AM PEAK HOUR
date:08-18-1989              time:14:30:49
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I4NBAM     GEOMETRICS=P18INT4F   SIGNAL=P18INT4
LOCATED IN CBD:N
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH   RT     LT TH RT       LT   TH   RT     WALK
EB    0  910    0      0  2  0      0.0 12.0  0.0     50
WB    0 1124    0      0  2  0      0.0 12.0  0.0     50
NB    0    0    0      0  0  0      0.0  0.0  0.0      0
SB  114    0   27      1  0  1     15.0  0.0 15.0     36

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK              PEDESTRIANS        ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%    N     0     0   .860  200   N    16.5    3
WB  0.0%  2.0%    N     0     0   .860  200   N    16.5    3
NB  0.0%  0.0%    N     0     0   .000    0   N    13.0    0
SB  2.0% %100.0%    N      0     0    .860  100    N    13.0     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *           *  *                          *   73.6   3    A
 2           *           *                 *     *     20.4   3    A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0  910    0  .860     0 1058    0
WB     0 1124    0  .860     0 1307    0
NB     0    0    0  .000     0    0    0
SB   114    0   27  .860   133    0   31

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  TH        1058 2 1.05 1111 0.00 0.00
WB  TH        1307 2 1.05 1372 0.00 0.00
SB  LT         133 1 1.00  133 1.00 0.00
SB  RT          31 1 1.00   31 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN              OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                 LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
SOUTHBOUND        0    0    0         0    0    0        0   0   0        0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH        1800  2 1.000 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3564
WB  TH        1800  2 1.000 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3564
SB  LT        1800  1 1.100 0.667 0.990 1.000 1.000 1.000 1.000 0.950 1241
SB  RT        1800  1 1.100 0.667 0.990 1.000 1.000 1.000 0.755 1.000  986

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH       1111 3564 0.31 0.74 2623 0.42
WB  TH       1372 3564 0.39 0.74 2623 0.52     *
SB  LT        133 1241 0.11 0.20  253 0.52     *
```

SB RT 31 986 0.03 0.20 201 0.16

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.49 TOTAL V/C= 0.52

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.42	0.74	100.0	3.85	2623	0.07	0.85	3.33	A	7.8	8
WB	TH	0.52	0.74	100.0	4.31	2623	0.16	0.85	3.80	A	9.6	10
SB	LT	0.52	0.20	100.0	26.95	253	1.58	1.00	28.53	D	2.9	4
SB	RT	0.16	0.20	100.0	24.86	201	0.03	0.85	21.16	C	0.7	1

DIR	Delay	LOS
EB	3.33	A
WB	3.80	A
SB	27.12	D

INTERSECTION DELAY = 5.05 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 12.4 SECONDS
THE EXISTING TIMING IS OPTIMAL

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
RUGGLES STREET/BUSWAY (OUTBOUND)
NO BUILD CONDITIONS: PM PEAK HOUR
date:08-18-1989              time:14:35:21
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I4NBPM     GEOMETRICS=P18INT4F   SIGNAL=P18INT4
LOCATED IN CBD:N
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH   RT     LT TH RT       LT   TH   RT     WALK
EB    0 1074    0      0  2  0      0.0 12.0  0.0     50
WB    0 1146    0      0  2  0      0.0 12.0  0.0     50
NB    0    0    0      0  0  0      0.0  0.0  0.0      0
SB   88    0   15      1  0  1     15.0  0.0 15.0     36

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK              PEDESTRIANS          ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%    N     0     0   .970  200   N    16.5    3
WB  0.0%  2.0%    N     0     0   .970  200   N    16.5    3
NB  0.0%  0.0%    N     0     0   .860    0   N    13.0    3
SB  2.0% %100.0%   N      0     0   .860  100   N    13.0     3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *           *  *                          *  76.0   3    A
 2           *           *                 *     *  18.0   3    A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0 1074    0  .970     0 1107    0
WB     0 1146    0  .970     0 1181    0
NB     0    0    0  .860     0    0    0
SB    88    0   15  .860   102    0   17

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  TH        1107 2 1.05 1163 0.00 0.00
WB  TH        1181 2 1.05 1241 0.00 0.00
SB  LT         102 1 1.00  102 1.00 0.00
SB  RT          17 1 1.00   17 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN              OPPOSING APPROACH
BEING OPPOSED      VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
SOUTHBOUND       0    0    0         0    0    0        0   0   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH        1800  2 1.000 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3564
WB  TH        1800  2 1.000 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3564
SB  LT        1800  1 1.100 0.667 0.990 1.000 1.000 1.000 1.000 0.950 1241
SB  RT        1800  1 1.100 0.667 0.990 1.000 1.000 1.000 0.755 1.000  986

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH       1163 3564 0.33 0.76 2709 0.43
WB  TH       1241 3564 0.35 0.76 2709 0.46     *
SB  LT        102 1241 0.08 0.18  223 0.46     *
```

SB RT 17 986 0.02 0.18 178 0.10

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.43 TOTAL V/C= 0.46

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.43	0.76	100.0	3.25	2709	0.07	0.85	2.82	A	7.4	7
WB	TH	0.46	0.76	100.0	3.36	2709	0.09	0.85	2.93	A	7.9	8
SB	LT	0.46	0.18	100.0	27.85	223	1.07	1.00	28.92	D	2.3	3
SB	RT	0.10	0.18	100.0	26.01	178	0.01	0.85	22.12	C	0.4	1

DIR	Delay	LOS
EB	2.82	A
WB	2.93	A
SB	27.93	D

INTERSECTION DELAY = 4.07 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 11.0 SECONDS
THE EXISTING TIMING IS OPTIMAL

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
RUGGLES STREET/BUSWAY (OUTBOUND)
NO BUILD CONDITIONS: SAT PEAK HOUR
date:08-18-1989              time:14:38:26
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I4NBSAT    GEOMETRICS=P18INT4F   SIGNAL=P18INT4
LOCATED IN CBD:N
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH   RT     LT TH RT      LT   TH   RT     WALK
EB    0 1115    0      0  2  0     0.0 12.0  0.0     50
WB    0  900    0      0  2  0     0.0 12.0  0.0     50
NB    0    0    0      0  0  0     0.0  0.0  0.0      0
SB   75    0   15      1  0  1    15.0  0.0 15.0     36

TRAFFIC & ROADWAY CONDITIONS
                 ADJ PARK              PEDESTRIANS          ARR
DIR GRADE %HV    Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%    N     0     0   .880  100   N    16.5    3
WB  0.0%  2.0%    N     0     0   .880  100   N    16.5    3
NB  0.0%  0.0%    N     0     0   .860    0   N    13.0    3
SB  2.0% %100.0%   N     0     0   .880  100   N    13.0    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *           *  *                          *  79.4   3    A
 2           *           *              *     *     14.6   3    A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0 1115    0  .880     0 1267    0
WB     0  900    0  .880     0 1023    0
NB     0    0    0  .860     0    0    0
SB    75    0   15  .880    85    0   17

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  TH        1267 2 1.05 1330 0.00 0.00
WB  TH        1023 2 1.05 1074 0.00 0.00
SB  LT          85 1 1.00   85 1.00 0.00
SB  RT          17 1 1.00   17 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN              OPPOSING APPROACH
BEING OPPOSED      VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
SOUTHBOUND       0    0    0         0    0    0        0   0   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH        1800  2 1.000 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3564
WB  TH        1800  2 1.000 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3564
SB  LT        1800  1 1.100 0.667 0.990 1.000 1.000 1.000 1.000 0.950 1241
SB  RT        1800  1 1.100 0.667 0.990 1.000 1.000 1.000 0.802 1.000 1049

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH       1330 3564 0.37 0.79 2830 0.47     *
WB  TH       1074 3564 0.30 0.79 2830 0.38
SB  LT         85 1241 0.07 0.15  181 0.47     *
```

SB RT 17 1049 0.02 0.15 153 0.11

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.44 TOTAL V/C= 0.47

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.47	0.79	100.0	2.57	2830	0.10	0.85	2.27	A	7.3	7
WB	TH	0.38	0.79	100.0	2.31	2830	0.04	0.85	2.00	A	5.9	6
SB	LT	0.47	0.15	100.0	29.75	181	1.45	1.00	31.20	D	2.0	3
SB	RT	0.11	0.15	100.0	28.17	153	0.01	0.85	23.96	C	0.4	1

DIR	Delay	LOS
EB	2.27	A
WB	2.00	A
SB	29.99	D

INTERSECTION DELAY = 3.28 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 11.2 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/PRENTISS
NO BUILD CONDITIONS - AM PEAK HOUR
date:08-17-1989 time:11:36:29
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I5NBAM GEOMETRICS=P18INT5 SIGNAL=P18INT5
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	70	0	25	0	1	0	0.0	13.0	0.0	26
WB	0	0	0	0	0	0	0.0	0.0	0.0	0
NB	295	2091	0	0	3	0	0.0	11.0	0.0	68
SB	0	1003	125	0	3	0	0.0	11.0	0.0	68

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.960	100	N	10.5	3
WB	0.0%	0.0%	N	0	0	.000	0	N	10.5	0
NB	0.0%	2.0%	N	0	5	.960	100	N	21.0	3
SB	0.0%	2.0%	N	0	5	.960	50	N	21.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*					*	*				*	*		84.7	3	A
2	*		*									*			*	*	9.3	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	70	0	25	.960	73	0	26
WB	0	0	0	.000	301	355	0
NB	295	2091	0	.960	307	2178	0
SB	0	1003	125	.960	0	1045	130

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-RT	99	1	1.00	99	0.74	0.26
NB	LT-TH	2485	3	1.10	2734	0.12	0.00
SB	TH-RT	1175	3	1.10	1293	0.00	0.11

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	301	355	0	0	0	0	0	0	0	0
NORTHBOUND	0	1045	130	100	100	85	0	3	0	1155

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-RT	1800	1	1.033	0.990	1.000	1.000	1.000	1.000	0.852	0.783	1228
NB	LT-TH	1800	3	0.967	0.990	1.000	1.000	0.993	1.000	1.000	0.726	3724
SB	TH-RT	1800	3	0.967	0.990	1.000	1.000	0.993	1.000	0.979	1.000	5023

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
NB	100	85	3	2485	1399	307	0.12	3	1155	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
NB	5400	0.214	80.544	0.153	1.000	4.162	0.000	0.000	7.349	0.177	0.726

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-RT	99	1228	0.08	0.09	114	0.87	*
NB	LT-TH	2734	3724	0.73	0.85	3154	0.87	*
SB	TH-RT	1293	5023	0.26	0.85	4255	0.30	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.81 TOTAL V/C= 0.87

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-RT	0.87	0.09	100.0	34.00	114	31.17	1.00	65.17	F	3.0	6
NB	LT-TH	0.87	0.85	100.0	3.34	3154	2.03	0.85	4.56	A	10.6	11
SB	TH-RT	0.30	0.85	100.0	1.20	4255	0.01	0.85	1.03	A	5.0	5

DIR	Delay	LOS
EB	65.17	F
NB	4.56	A
SB	1.03	A

INTERSECTION DELAY = 4.91 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 42.1 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/PRENTISS
NO BUILD CONDITIONS - PM PEAK HOUR
date:08-17-1989 time:12:05:38
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I5NBPM GEOMETRICS=P18INT5 SIGNAL=P18INT5
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	96	0	64	0	1	0	0.0	13.0	0.0	26
WB	0	0	0	0	0	0	0.0	0.0	0.0	0
NB	111	1521	0	0	3	0	0.0	11.0	0.0	68
SB	0	1758	99	0	3	0	0.0	11.0	0.0	68

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	100	N	10.5	3
WB	0.0%	0.0%	N	0	0	.000	0	N	10.5	0
NB	0.0%	2.0%	N	0	5	.950	100	N	21.0	3
SB	0.0%	2.0%	N	0	5	.950	100	N	21.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*					*	*				*	*		74.6	3	A
2	*		*									*			*	*	19.4	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	96	0	64	.950	101	0	67
WB	0	0	0	.000	0	0	0
NB	111	1521	0	.950	117	1601	0
SB	0	1758	99	.950	0	1851	104

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-RT	168	1	1.00	168	0.60	0.40
NB	LT-TH	1718	3	1.10	1890	0.07	0.00
SB	TH-RT	1955	3	1.10	2150	0.00	0.05

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	0	0	0	0	0	0	0	0	0
NORTHBOUND	0	1851	104	100	100	75	0	3	0	1399

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-RT	1800	1	1.033	0.990	1.000	1.000	1.000	1.000	0.827	0.790	1204
NB	LT-TH	1800	3	0.967	0.990	1.000	1.000	0.993	1.000	1.000	0.685	3514
SB	TH-RT	1800	3	0.967	0.990	1.000	1.000	0.993	1.000	0.990	1.000	5081

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
NB	100	75	3	1718	1399	117	0.07	3	1399	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
NB	5400	0.259	65.705	0.001	1.000	8.885	0.000	0.000	1800.000	0.054	0.685

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-RT	168	1204	0.14	0.19	234	0.72	*
NB	LT-TH	1890	3514	0.54	0.75	2621	0.72	*
SB	TH-RT	2150	5081	0.42	0.75	3790	0.57	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.68 TOTAL V/C= 0.72

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-RT	0.72	0.19	100.0	28.69	234	6.98	1.00	35.67	D	3.8	6
NB	LT-TH	0.72	0.75	100.0	5.31	2621	0.70	0.85	5.11	B	12.1	12
SB	TH-RT	0.57	0.75	100.0	4.25	3790	0.15	0.85	3.75	A	13.8	14

DIR	Delay	LOS
EB	35.67	D
NB	5.11	B
SB	3.75	A

INTERSECTION DELAY = 5.63 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 20.9 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/PRENTISS
NO BUILD CONDITIONS - SAT PEAK HOUR
date:08-17-1989 time:12:11:18
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I5NBSAT GEOMETRICS=P18INT5 SIGNAL=P18INT5
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	25	0	26	0	1	0	0.0	13.0	0.0	26
WB	0	0	0	0	0	0	0.0	0.0	0.0	0
NB	55	1661	0	0	3	0	0.0	11.0	0.0	68
SB	0	1470	44	0	3	0	0.0	11.0	0.0	68

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.930	100	N	10.5	3
WB	0.0%	0.0%	N	0	0	.000	0	N	10.5	0
NB	0.0%	2.0%	N	0	5	.930	100	N	21.0	3
SB	0.0%	2.0%	N	0	5	.930	100	N	21.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*					*	*				*	*		87.2	3	A
2	*		*									*			*	*	6.8	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	25	0	26	.930	27	0	28
WB	0	0	0	.000	0	0	0
NB	55	1661	0	.930	59	1786	0
SB	0	1470	44	.930	0	1581	47

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-RT	55	1	1.00	55	0.49	0.51
NB	LT-TH	1845	3	1.10	2030	0.03	0.00
SB	TH-RT	1628	3	1.10	1791	0.00	0.03

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	0	0	0	0	0	0	0	0	0
NORTHBOUND	0	1581	47	100	100	87	0	3	0	1399

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-RT	1800	1	1.033	0.990	1.000	1.000	1.000	1.000	0.807	0.810	1204
NB	LT-TH	1800	3	0.967	0.990	1.000	1.000	0.993	1.000	1.000	0.682	3501
SB	TH-RT	1800	3	0.967	0.990	1.000	1.000	0.993	1.000	0.994	1.000	5103

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
NB	100	87	3	1845	1399	59	0.03	3	1399	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
NB	5400	0.259	82.663	0.001	1.000	4.492	0.000	0.000	1800.000	0.046	0.682

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-RT	55	1204	0.05	0.07	82	0.67	*
NB	LT-TH	2030	3501	0.58	0.87	3051	0.67	*
SB	TH-RT	1791	5103	0.35	0.87	4448	0.40	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.63 TOTAL V/C= 0.67

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-RT	0.67	0.07	100.0	34.55	82	11.96	1.00	46.51	E	1.4	3
NB	LT-TH	0.67	0.87	100.0	1.49	3051	0.40	0.85	1.60	A	6.6	7
SB	TH-RT	0.40	0.87	100.0	0.97	4448	0.03	0.85	0.85	A	5.8	6

DIR	Delay	LOS
EB	46.51	E
NB	1.60	A
SB	0.85	A

INTERSECTION DELAY = 1.89 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 17.6 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
HUNTINGTON/RUGGLES
NO BUILD CONDITIONS - AM PEAK HOUR
date:08-15-1989 time:05:48:33
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I6NBAM GEOMETRICS=P18INT6E SIGNAL=P18INT6
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	14	478	12	1	1	0	8.0	8.0	0.0	29
WB	191	741	16	1	1	0	11.0	12.0	0.0	29
NB	18	679	285	0	2	1	0.0	11.0	10.0	49
SB	53	637	137	0	2	1	0.0	11.0	9.0	48

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.910	200	N	11.3	3
WB	0.0%	2.0%	N	2	0	.910	200	N	11.3	3
NB	0.0%	2.0%	N	0	10	.910	200	N	16.3	3
SB	0.0%	2.0%	N	0	10	.910	200	N	16.3	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*	*	*	*		*	*	*		37.1	3	A
2					*	*	*					*				*	1.8	0	A
3	*	*	*		*	*	*					*				*	55.1	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	14	478	12	.910	15	525	13
WB	191	741	16	.910	210	814	18
NB	18	679	285	.910	20	746	313
SB	53	637	137	.910	58	700	151

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	15	1	1.00	15	1.00	0.00
EB	TH-RT	538	1	1.00	538	0.00	0.02
WB	LT	210	1	1.00	210	1.00	0.00
WB	TH-RT	832	1	1.00	832	0.00	0.02
NB	LT-TH	766	2	1.05	804	0.03	0.00
NB	RT	313	1	1.00	313	0.00	1.00
SB	LT-TH	758	2	1.05	796	0.08	0.00
SB	RT	151	1	1.00	151	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	210	814	18	0	97	97	1	1	0	806
WESTBOUND	15	525	13	100	100	100	1	1	0	538
NORTHBOUND	58	700	151	100	100	0	0	2	1	758
SOUTHBOUND	20	746	313	100	100	0	0	2	1	766

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	1	0.867	0.990	1.000	1.000	1.000	1.000	1.000	0.185	285
EB	TH-RT	1800	1	0.867	0.990	1.000	1.000	1.000	1.000	0.994	1.000	1535

WB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1637
WB	TH-RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.995	1.000	1773
NB	LT-TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.812	2797
NB	RT	1800	1	0.933	0.990	1.000	1.000	0.958	1.000	0.755	1.000	1203
SB	LT-TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.750	2585
SB	RT	1800	1	0.900	0.990	1.000	1.000	0.958	1.000	0.755	1.000	1160

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	100	55	1	15	538	15	1.00	1	806	0.00
NB	100	37	2	766	1079	20	0.03	2	758	0.08
SB	100	37	2	758	909	58	0.08	2	766	0.03

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	1800	0.448	18.727	0.372	1.000	36.374	0.000	0.000	3.028	0.185	0.185
NB	2659	0.285	12.007	0.401	0.129	25.095	0.871	11.138	2.805	0.624	0.812
SB	3368	0.227	18.590	0.396	0.317	18.513	0.683	4.183	2.839	0.500	0.750

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT	15	285	0.05	0.55	157	0.10	
EB	TH-RT	538	1535	0.35	0.55	846	0.64	
WB	LT	210	1637	0.01	0.02	395	0.53	
WB	TH-RT	832	1773	0.47	0.57	1009	0.82	*
NB	LT-TH	804	2797	0.29	0.37	1038	0.77	
NB	RT	313	1203	0.26	0.37	446	0.70	
SB	LT-TH	796	2585	0.31	0.37	959	0.83	*
SB	RT	151	1160	0.13	0.37	430	0.35	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.78 TOTAL V/C= 0.83
FOR THE WESTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
69 LEFT TURNS ON THE CHANGE INTERVAL AND 296 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.10	0.55	100.0	8.10	157	0.01	0.85	6.89	B	0.2	1
EB	TH-RT	0.64	0.55	100.0	11.80	846	1.14	0.85	10.99	B	6.7	7
WB	LT	0.53	0.57	100.0	10.12	395	1.10	1.00	11.22	B	5.7	6
WB	TH-RT	0.82	0.57	100.0	13.30	1009	4.00	0.85	14.70	B	10.0	11
NB	LT-TH	0.77	0.37	100.0	21.10	1038	2.61	0.85	20.15	C	13.4	14
NB	RT	0.70	0.37	100.0	20.32	446	3.37	0.85	20.14	C	5.5	6
SB	LT-TH	0.83	0.37	100.0	21.73	959	4.39	0.85	22.20	C	13.2	15
SB	RT	0.35	0.37	100.0	17.27	430	0.21	0.85	14.86	B	2.6	3

DIR	Delay	LOS
EB	10.88	B
WB	14.00	B
NB	20.15	C
SB	21.03	C

INTERSECTION DELAY = 17.22 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 33.0 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 37.3 secs green, 3.0 secs yellow + red clear
suggested timing phase 2 is 1.5 secs green, 0.0 secs yellow + red clear
suggested timing phase 3 is 55.2 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
HUNTINGTON/RUGGLES
NO BUILD CONDITIONS - PM PEAK HOUR
date:08-15-1989 time:05:59:44
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I6NBPM GEOMETRICS=P18INT6E SIGNAL=P18INT6
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	94	541	41	1	1	0	8.0	8.0	0.0	29
WB	354	728	71	1	1	0	11.0	12.0	0.0	29
NB	7	887	543	0	2	1	0.0	11.0	10.0	49
SB	75	859	102	0	2	1	0.0	11.0	9.0	48

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.820	200	N	11.3	3
WB	0.0%	2.0%	N	0	0	.820	200	N	11.3	3
NB	0.0%	2.0%	N	0	10	.820	200	N	16.3	3
SB	0.0%	2.0%	N	0	10	.820	200	N	16.3	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*	*	*	*		*	*	*		42.3	3	A
2					*	*	*					*				*	10.8	0	A
3	*	*	*		*	*	*					*				*	41.0	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	94	541	41	.820	115	660	50
WB	354	728	71	.820	432	888	87
NB	7	887	543	.820	9	1082	662
SB	75	859	102	.820	91	1048	124

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	115	1	1.00	115	1.00	0.00
EB	TH-RT	710	1	1.00	710	0.00	0.07
WB	LT	432	1	1.00	432	1.00	0.00
WB	TH-RT	974	1	1.00	974	0.00	0.09
NB	LT-TH	1090	2	1.05	1145	0.01	0.00
NB	RT	662	1	1.00	662	0.00	1.00
SB	LT-TH	1139	2	1.05	1196	0.08	0.00
SB	RT	124	1	1.00	124	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	432	888	87	0	79	79	1	1	0	772
WESTBOUND	115	660	50	100	100	100	1	1	0	710
NORTHBOUND	91	1048	124	100	100	0	0	2	1	1139
SOUTHBOUND	9	1082	662	100	100	0	0	2	1	1090

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	1	0.867	0.990	1.000	1.000	1.000	1.000	1.000	0.098	151
EB	TH-RT	1800	1	0.867	0.990	1.000	1.000	1.000	1.000	0.983	1.000	1518

```
WB  LT        1800  1 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.950 1637
WB  TH-RT     1800  1 1.000 0.990 1.000 1.000 1.000 1.000 0.978 1.000 1743
NB  LT-TH     1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.748 2578
NB  RT        1800  1 0.933 0.990 1.000 1.000 0.958 1.000 0.755 1.000 1203
SB  LT-TH     1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.600 2066
SB  RT        1800  1 0.900 0.990 1.000 1.000 0.958 1.000 0.755 1.000 1160

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
EB 100  41  1  115  710  115 1.00  1  772 0.00
NB 100  42  2 1090 1399    9 0.01  2 1139 0.08
SB 100  42  2 1139 1263   91 0.08  2 1090 0.01
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf      El    Fm   Flt
EB 1800 0.429  0.000 0.393 1.000 40.959 0.000  0.000   2.865 0.098 0.098
NB   25 1.000  0.000 0.163 0.081 42.286 0.919 18.820   6.897 0.496 0.748
SB 3287 0.332 13.638 0.194 0.556 28.648 0.444  1.598   5.811 0.199 0.600

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT        115  151 0.76 0.41   62 1.86     *
EB  TH-RT     710 1518 0.47 0.41  622 1.14
WB  LT        432 1637 0.18 0.11  262 1.65     *
WB  TH-RT     974 1743 0.56 0.52  902 1.08
NB  LT-TH    1145 2578 0.44 0.42 1090 1.05
NB  RT        662 1203 0.55 0.42  509 1.30
SB  LT-TH    1196 2066 0.58 0.42  874 1.37     *
SB  RT        124 1160 0.11 0.42  491 0.25

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 1.52 TOTAL V/C= 1.61
FOR THE WESTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  17 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1     c      d2    PF   Delay LOS Avg Q  95% Q
EB  LT       1.86 0.41 100.0  55.19   62 1165.28 0.85 1037.40  F  34.0   100
EB  TH-RT    1.14 0.41 100.0  24.88  622   82.07 0.85   90.91  F  23.7    55
WB  LT       1.65 0.52 100.0  60.45  262  647.39 1.00  707.84  F  90.2   255
WB  TH-RT    1.08 0.52 100.0  20.09  902   48.73 0.85   58.50  E  22.4    48
NB  LT-TH    1.05 0.42 100.0  22.77 1090   35.15 0.85   49.23  E  23.6    46
NB  RT       1.30 0.42 100.0  28.15  509  194.83 0.85  189.53  F  40.2   105
SB  LT-TH    1.37 0.42 100.0  30.06  874  249.88 0.85  237.95  F  84.4   227
SB  RT       0.25 0.42 100.0  14.18  491    0.06 0.85   12.10  B   2.0     2

DIR Delay LOS
EB 222.52  F
WB 257.86  F
NB 100.65  F
SB 216.68  F
INTERSECTION DELAY =189.25 INTERSECTION LOS=F

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS
:
THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
for chosen cycle length 100.0
suggested timing phase 1 is  35.9 secs green,   3.0 secs yellow + red clear
suggested timing phase 2 is  11.0 secs green,   0.0 secs yellow + red clear
suggested timing phase 3 is  47.1 secs green,   3.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
HUNTINGTON/RUGGLES
NO BUILD CONDITIONS - SAT PEAK HOUR
date:08-15-1989 time:05:35:54
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I6NBSAT GEOMETRICS=P18INT6E SIGNAL=P18INT6
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	61	340	34	1	1	0	8.0	8.0	0.0	29
WB	150	406	32	1	1	0	11.0	12.0	0.0	29
NB	17	913	198	0	2	1	0.0	11.0	10.0	49
SB	53	877	133	0	2	1	0.0	11.0	9.0	48

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.940	100	N	11.3	3
WB	0.0%	2.0%	N	2	0	.940	100	N	11.3	3
NB	0.0%	2.0%	N	0	10	.940	200	N	16.3	3
SB	0.0%	2.0%	N	0	10	.940	200	N	16.3	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*	*	*	*		*	*	*		56.2	3	A
2					*	*	*					*				*	1.8	0	A
3	*	*	*		*	*	*					*				*	36.0	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	61	340	34	.940	65	362	36
WB	150	406	32	.940	160	432	34
NB	17	913	198	.940	18	971	211
SB	53	877	133	.940	56	933	141

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	65	1	1.00	65	1.00	0.00
EB	TH-RT	398	1	1.00	398	0.00	0.09
WB	LT	160	1	1.00	160	1.00	0.00
WB	TH-RT	466	1	1.00	466	0.00	0.07
NB	LT-TH	989	2	1.05	1039	0.02	0.00
NB	RT	211	1	1.00	211	0.00	1.00
SB	LT-TH	989	2	1.05	1039	0.06	0.00
SB	RT	141	1	1.00	141	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	160	432	34	0	95	95	1	1	0	444
WESTBOUND	65	362	36	100	100	100	1	1	0	398
NORTHBOUND	56	933	141	100	100	0	0	2	1	989
SOUTHBOUND	18	971	211	100	100	0	0	2	1	989

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	1	0.867	0.990	1.000	1.000	1.000	1.000	1.000	0.333	514
EB	TH-RT	1800	1	0.867	0.990	1.000	1.000	1.000	1.000	0.978	1.000	1510

WB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1637
WB	TH-RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.982	1.000	1750
NB	LT-TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.815	2807
NB	RT	1800	1	0.933	0.990	1.000	1.000	0.958	1.000	0.802	1.000	1279
SB	LT-TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.734	2528
SB	RT	1800	1	0.900	0.990	1.000	1.000	0.958	1.000	0.802	1.000	1233

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	100	36	1	65	398	65	1.00	1	444	0.00
NB	100	56	2	989	1200	18	0.02	2	989	0.06
SB	100	56	2	989	1131	56	0.06	2	989	0.02

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	1800	0.247	15.049	0.597	1.000	20.968	0.000	0.000	1.883	0.333	0.333
NB	2473	0.400	27.029	0.257	0.108	29.197	0.892	13.391	4.383	0.630	0.815
SB	3261	0.303	37.161	0.257	0.285	19.065	0.715	4.807	4.383	0.468	0.734

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT	65	514	0.13	0.36	185	0.35	
EB	TH-RT	398	1510	0.26	0.36	544	0.73	*
WB	LT	160	1637	0.01	0.02	269	0.59	*
WB	TH-RT	466	1750	0.27	0.38	661	0.70	
NB	LT-TH	1039	2807	0.37	0.56	1578	0.66	
NB	RT	211	1279	0.16	0.56	719	0.29	
SB	LT-TH	1039	2528	0.41	0.56	1422	0.73	*
SB	RT	141	1233	0.11	0.56	693	0.20	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.68 TOTAL V/C= 0.73
FOR THE WESTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
69 LEFT TURNS ON THE CHANGE INTERVAL AND 171 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.35	0.36	100.0	17.80	185	0.49	0.85	15.55	C	1.2	1
EB	TH-RT	0.73	0.36	100.0	21.12	544	3.47	0.85	20.90	C	7.1	8
WB	LT	0.59	0.38	100.0	18.96	269	2.51	1.00	21.48	C	4.4	4
WB	TH-RT	0.70	0.38	100.0	20.05	661	2.37	0.85	19.06	C	8.1	8
NB	LT-TH	0.66	0.56	100.0	11.56	1578	0.72	0.85	10.44	B	12.0	12
NB	RT	0.29	0.56	100.0	8.72	719	0.07	0.85	7.47	B	2.6	3
SB	LT-TH	0.73	0.56	100.0	12.36	1422	1.37	0.85	11.67	B	12.0	12
SB	RT	0.20	0.56	100.0	8.22	693	0.02	0.85	7.01	B	1.7	2

DIR	Delay	LOS
EB	20.15	C
WB	19.68	C
NB	9.94	B
SB	11.11	B

INTERSECTION DELAY = 13.41 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 21.5 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 56.4 secs green, 3.0 secs yellow + red clear
suggested timing phase 2 is 1.4 secs green, 0.0 secs yellow + red clear
suggested timing phase 3 is 36.2 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/COLUMBUS/NEW DUDLEY
NO BUILD CONDITIONS - AM PEAK HOUR
date:08-13-1989 time:21:13:39
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I7NBAM GEOMETRICS=P18INT7 SIGNAL=P18INT7
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	233	238	224	0	2	0	0.0	12.0	0.0	50
WB	27	424	0	0	2	0	0.0	12.0	0.0	50
NB	449	1869	52	1	3	0	10.0	11.0	0.0	47
SB	200	564	188	1	3	0	10.0	11.0	0.0	46

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.940	200	N	16.5	3
WB	0.0%	2.0%	N	0	0	.940	300	N	16.5	3
NB	0.0%	2.0%	N	0	5	.940	300	N	15.8	3
SB	0.0%	2.0%	N	0	5	.940	200	N	15.8	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*									*				*	3.9	0	A
2	*	*	*		*	*						*				*	26.6	3	A
3				*				*	*				*				15.4	0	A
4				*				*	*	*	*		*	*	*		48.1	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	233	238	224	.940	248	253	238
WB	27	424	0	.940	29	451	0
NB	449	1869	52	.940	478	1988	55
SB	200	564	188	.940	213	600	200

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	739	2	1.05	776	0.34	0.32
WB	LT-TH	480	2	1.05	504	0.06	0.00
NB	LT	478	1	1.00	478	1.00	0.00
NB	TH-RT	2044	3	1.10	2248	0.00	0.03
SB	LT	213	1	1.00	213	1.00	0.00
SB	TH-RT	800	3	1.10	880	0.00	0.25

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	29	451	0	100	100	0	0	2	0	480
WESTBOUND	248	253	238	87	87	87	0	2	0	645
NORTHBOUND	213	600	200	100	100	100	1	3	0	800
SOUTHBOUND	478	1988	55	100	100	100	1	3	0	1399

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.906	0.861	2779
WB	LT-TH	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	1.000	0.681	2427
NB	LT	1800	1	0.933	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1580
NB	TH-RT	1800	3	0.967	0.990	1.000	1.000	0.993	1.000	0.992	1.000	5092

```
SB  LT        1800  1 0.933 0.990 1.000 1.000 1.000 1.000 1.000 0.950 1580
SB  TH-RT     1800  3 0.967 0.990 1.000 1.000 0.993 1.000 0.939 1.000 4818

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB 100  27  2  480  480   29 0.06  2  645 0.34
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf     El    Fm   Flt
WB 2726 0.237  3.808 0.472 0.313 22.764 0.687  4.338  2.385 0.362 0.681

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT  776 2779 0.28 0.30  846 0.92     *
WB  LT-TH     504 2427 0.21 0.27  645 0.78
NB  LT        478 1580 0.14 0.15  527 0.91     *
NB  TH-RT    2248 5092 0.44 0.48 2450 0.92     *
SB  LT        213 1580 0.11 0.15  311 0.69
SB  TH-RT     880 4818 0.18 0.48 2318 0.38

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.86 TOTAL V/C= 0.92
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  217 ON THE PERMISSIVE PHASE
FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  0 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1    c      d2    PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.92 0.30 100.0  25.51  846   10.61 0.85   30.70  D  14.3   20
WB  LT-TH    0.78 0.27 100.0  25.85  645    4.27 0.85   25.61  D   9.8   11
NB  LT       0.91 0.64 100.0  11.91  527   13.75 1.00   25.66  D  11.2   11
NB  TH-RT    0.92 0.48 100.0  18.31 2450    4.46 0.85   19.35  C  29.4   34
SB  LT       0.69 0.64 100.0   8.94  311    4.21 1.00   13.15  B   5.0    5
SB  TH-RT    0.38 0.48 100.0  12.51 2318    0.05 0.85   10.68  B  11.5   12

DIR Delay LOS
EB  30.70  D
WB  25.61  D
NB  20.46  C
SB  11.16  B
INTERSECTION DELAY = 20.53 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  63.8 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is   3.9 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  26.6 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  15.3 secs green,   0.0 secs yellow + red clear
suggested timing phase 4 is  48.2 secs green,   3.0 secs yellow + red clear
```

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/COLUMBUS/NEW DUDLEY
NO BUILD CONDITIONS - PM PEAK HOUR
date:08-13-1989 time:21:20:08
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I7NBPM GEOMETRICS=P18INT7 SIGNAL=P18INT7
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	270	293	505	0	2	0	0.0	12.0	0.0	50
WB	52	385	0	0	2	0	0.0	12.0	0.0	50
NB	315	963	3	1	3	0	10.0	11.0	0.0	47
SB	216	1389	165	1	3	0	10.0	11.0	0.0	46

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	200	N	16.5	3
WB	0.0%	2.0%	N	0	0	.950	200	N	16.5	3
NB	0.0%	2.0%	N	0	5	.950	300	N	15.8	3
SB	0.0%	2.0%	N	0	5	.950	200	N	15.8	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*									*				*	9.7	0	A
2	*	*	*		*	*						*				*	32.5	3	A
3				*				*	*				*				16.4	0	A
4				*				*	*	*	*		*	*	*		35.4	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	270	293	505	.950	284	308	532
WB	52	385	0	.950	55	405	0
NB	315	963	3	.950	332	1014	3
SB	216	1389	165	.950	227	1462	174

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	1124	2	1.05	1180	0.25	0.47
WB	LT-TH	460	2	1.05	483	0.12	0.00
NB	LT	332	1	1.00	332	1.00	0.00
NB	TH-RT	1017	3	1.10	1119	0.00	0.00
SB	LT	227	1	1.00	227	1.00	0.00
SB	TH-RT	1636	3	1.10	1799	0.00	0.11

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	55	405	0	100	100	0	0	2	0	460
WESTBOUND	284	308	532	77	77	77	0	2	0	865
NORTHBOUND	227	1462	174	100	100	100	1	3	0	1399
SOUTHBOUND	332	1014	3	100	100	100	1	3	0	1017

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.862	0.895	2749
WB	LT-TH	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	1.000	0.586	2088
NB	LT	1800	1	0.933	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1580

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NB  TH-RT     1800  3 0.967 0.990 1.000 1.000 0.993 1.000 0.999 1.000 5129
SB  LT        1800  1 0.933 0.990 1.000 1.000 1.000 1.000 1.000 0.950 1580
SB  TH-RT     1800  3 0.967 0.990 1.000 1.000 0.993 1.000 0.974 1.000 4999

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB 100  32  2  460  460   55 0.12  2  865 0.25
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
WB 2924 0.296  4.095 0.335 0.777 28.364 0.223  0.574    3.363 0.172 0.586

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT 1180 2749 0.43 0.42 1160 1.02     *
WB  LT-TH     483 2088 0.23 0.32  678 0.71
NB  LT        332 1580 0.17 0.16  326 1.02     *
NB  TH-RT    1119 5129 0.22 0.35 1814 0.62
SB  LT        227 1580 0.09 0.16  398 0.57
SB  TH-RT    1799 4999 0.36 0.35 1768 1.02     *

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.96 TOTAL V/C= 1.02
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  0 ON THE PERMISSIVE PHASE
FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  72 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2    PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 1.02 0.42 100.0  22.25 1160   24.58 0.85   39.80  D  21.5   38
WB  LT-TH    0.71 0.32 100.0  22.55  678    2.45 0.85   21.25  C   8.6    9
NB  LT       1.02 0.52 100.0  18.65  326   43.01 1.00   61.66  F   9.5   18
NB  TH-RT    0.62 0.35 100.0  20.30 1814    0.46 0.85   17.64  C  18.3   18
SB  LT       0.57 0.52 100.0  12.54  398    1.46 1.00   14.00  B   5.3    5
SB  TH-RT    1.02 0.35 100.0  24.79 1768   20.60 0.85   38.59  D  32.2   54

DIR Delay LOS
EB  39.80  D
WB  21.25  C
NB  27.71  D
SB  35.83  D
INTERSECTION DELAY = 33.08 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
for chosen cycle length 100.0
suggested timing phase 1 is   9.7 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  32.5 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  16.4 secs green,   0.0 secs yellow + red clear
suggested timing phase 4 is  35.4 secs green,   3.0 secs yellow + red clear

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/COLUMBUS/NEW DUDLEY
NO BUILD CONDITIONS - SAT PEAK HOUR
date:08-13-1989 time:21:25:25
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I7NBSAT GEOMETRICS=P18INT7 SIGNAL=P18INT7
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	235	271	262	0	2	0	0.0	12.0	0.0	50
WB	68	278	0	0	2	0	0.0	12.0	0.0	50
NB	295	1105	19	1	3	0	10.0	11.0	0.0	47
SB	206	1028	165	1	3	0	10.0	11.0	0.0	46

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.890	100	N	16.5	3
WB	0.0%	2.0%	N	0	0	.890	100	N	16.5	3
NB	0.0%	2.0%	N	0	5	.890	100	N	15.8	3
SB	0.0%	2.0%	N	0	5	.890	100	N	15.8	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*									*				*	7.5	0	A
2	*	*	*		*	*						*				*	29.8	3	A
3				*				*	*				*				20.8	0	A
4				*				*	*	*	*		*	*	*		36.0	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	235	271	262	.890	264	304	294
WB	68	278	0	.890	76	312	0
NB	295	1105	19	.890	331	1242	21
SB	206	1028	165	.890	231	1155	185

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	863	2	1.05	906	0.31	0.34
WB	LT-TH	389	2	1.05	408	0.20	0.00
NB	LT	331	1	1.00	331	1.00	0.00
NB	TH-RT	1263	3	1.10	1389	0.00	0.02
SB	LT	231	1	1.00	231	1.00	0.00
SB	TH-RT	1340	3	1.10	1474	0.00	0.14

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	76	312	0	100	100	0	0	2	0	389
WESTBOUND	264	304	294	80	80	80	0	2	0	690
NORTHBOUND	231	1155	185	100	100	100	1	3	0	1340
SOUTHBOUND	331	1242	21	100	100	100	1	3	0	1263

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.933	0.891	2962
WB	LT-TH	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	1.000	0.622	2218
NB	LT	1800	1	0.933	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1580

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NB  TH-RT     1800  3 0.967 0.990 1.000 1.000 0.993 1.000 0.997 1.000 5115
SB  LT        1800  1 0.933 0.990 1.000 1.000 1.000 1.000 1.000 0.950 1580
SB  TH-RT     1800  3 0.967 0.990 1.000 1.000 0.993 1.000 0.973 1.000 4992

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB 100  30  2  389  389   76 0.20  2  690 0.31
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf      El    Fm   Flt
WB 2906 0.237  7.911 0.444 0.927 21.851 0.073  0.159   2.534 0.245 0.622

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT  906 2962 0.31 0.37 1103 0.82     *
WB  LT-TH     408 2218 0.18 0.30  660 0.62
NB  LT        331 1580 0.17 0.21  403 0.82     *
NB  TH-RT    1389 5115 0.27 0.36 1839 0.76
SB  LT        231 1580 0.12 0.21  416 0.56
SB  TH-RT    1474 4992 0.30 0.36 1795 0.82     *

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.77 TOTAL V/C= 0.82
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  8 ON THE PERMISSIVE PHASE
FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  21 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.82 0.37 100.0  21.56 1103   3.59 0.85   21.38  C  15.0   16
WB  LT-TH    0.62 0.30 100.0  22.98  660   1.27 0.85   20.61  C   7.6    8
NB  LT       0.82 0.57 100.0  13.32  403   8.81 1.00   22.13  C   7.3    7
NB  TH-RT    0.76 0.36 100.0  21.40 1839   1.29 0.85   19.28  C  22.5   22
SB  LT       0.56 0.57 100.0  10.38  416   1.26 1.00   11.64  B   5.1    5
SB  TH-RT    0.82 0.36 100.0  22.12 1795   2.27 0.85   20.73  C  23.8   24

DIR Delay LOS
EB  21.38  C
WB  20.61  C
NB  19.83  C
SB  19.50  C
INTERSECTION DELAY = 20.07 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  32.1 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is   7.4 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  29.8 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  20.8 secs green,   0.0 secs yellow + red clear
suggested timing phase 4 is  36.0 secs green,   3.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
PARKER/RUGGLES
NO BUILD CONDITIONS - AM PEAK HOUR
date:08-15-1989 time:05:00:42
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I8NBAM GEOMETRICS=P18INT8E SIGNAL=P18INT8
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	21	673	106	0	1	1	0.0	9.0	8.0	28
WB	57	701	104	0	1	0	0.0	15.0	0.0	28
NB	128	264	25	0	1	0	0.0	12.0	0.0	20
SB	132	241	40	0	1	0	0.0	11.0	0.0	20

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.930	100	N	11.0	3
WB	0.0%	2.0%	N	0	0	.930	100	N	11.0	3
NB	0.0%	2.0%	N	10	0	.930	100	N	9.0	3
SB	0.0%	2.0%	Y	0	0	.930	100	N	9.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*	*	*	*		*	*	*		35.6	3	P
2	*	*	*		*	*	*					*				*	58.4	3	P

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	21	673	106	.930	23	724	114
WB	57	701	104	.930	61	754	112
NB	128	264	25	.930	138	284	27
SB	132	241	40	.930	142	259	43

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	746	1	1.00	746	0.03	0.00
EB	RT	114	1	1.00	114	0.00	1.00
WB	LT-TH-RT	927	1	1.00	927	0.07	0.12
NB	LT-TH-RT	448	1	1.00	448	0.31	0.06
SB	LT-TH-RT	444	1	1.00	444	0.32	0.10

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	61	754	112	100	100	100	0	1	0	866
WESTBOUND	23	724	114	100	100	0	0	1	1	724
NORTHBOUND	142	259	43	100	100	100	0	1	0	302
SOUTHBOUND	138	284	27	100	100	100	0	1	0	311

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	1	0.900	0.990	1.000	1.000	1.000	1.000	1.000	0.749	1202
EB	RT	1800	1	0.867	0.990	1.000	1.000	1.000	1.000	0.802	1.000	1239
WB	LT-TH-RT	1800	1	1.100	0.990	1.000	1.000	1.000	1.000	0.878	0.771	1326
NB	LT-TH-RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.889	0.645	1022
SB	LT-TH-RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.882	0.627	953

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	100	58	1	746	838	23	0.03	1	866	0.07
WB	100	58	1	927	866	61	0.07	1	724	0.03
NB	100	36	1	448	311	138	0.31	1	302	0.32
SB	100	36	1	444	302	142	0.32	1	311	0.31

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	1571	0.551	7.349	0.334	0.030	51.038	0.970	34.834	3.368	0.749	0.749
WB	1680	0.431	26.888	0.423	0.066	31.500	0.934	18.629	2.661	0.771	0.771
NB	1489	0.203	19.226	0.686	0.307	16.387	0.693	4.292	1.640	0.645	0.645
SB	1505	0.207	18.853	0.681	0.320	16.760	0.680	4.089	1.653	0.627	0.627

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH	746	1202	0.62	0.58	702	1.06	
EB	RT	114	1239	0.09	0.58	724	0.16	
WB	LT-TH-RT	927	1326	0.70	0.58	774	1.20	*
NB	LT-TH-RT	448	1022	0.44	0.36	364	1.23	
SB	LT-TH-RT	444	953	0.47	0.36	339	1.31	*

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 1.16 TOTAL V/C= 1.24

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH	1.06	0.58	100.0	17.36	702	45.28	1.00	62.63	F	17.3	40
EB	RT	0.16	0.58	100.0	7.25	724	0.01	1.00	7.26	B	1.3	1
WB	LT-TH-RT	1.20	0.58	100.0	21.85	774	111.34	1.00	133.19	F	39.6	104
NB	LT-TH-RT	1.23	0.36	100.0	28.06	364	146.96	1.00	175.02	F	25.8	66
SB	LT-TH-RT	1.31	0.36	100.0	29.50	339	208.70	1.00	238.20	F	33.4	89

DIR	Delay	LOS
EB	55.29	E
WB	133.19	F
NB	175.02	F
SB	238.20	F

INTERSECTION DELAY =132.59 INTERSECTION LOS=F

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
for chosen cycle length 100.0
suggested timing phase 1 is 37.6 secs green, 3.0 secs yellow + red clear
suggested timing phase 2 is 56.4 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
PARKER/RUGGLES
NO BUILD CONDITIONS - PM PEAK HOUR
date:08-15-1989 time:05:03:37
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I8NBPM GEOMETRICS=P18INT8E SIGNAL=P18INT8
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	32	853	115	0	1	1	0.0	9.0	8.0	28
WB	34	941	103	0	1	0	0.0	15.0	0.0	28
NB	99	182	33	0	1	0	0.0	12.0	0.0	20
SB	168	269	28	0	1	0	0.0	11.0	0.0	20

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.970	100	N 11.0	3
WB	0.0%	2.0%	N	0	0	.970	100	N 11.0	3
NB	0.0%	2.0%	N	10	0	.970	100	N 9.0	3
SB	0.0%	2.0%	Y	0	0	.970	100	N 9.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*	*	*	*		*	*	*		30.4	3	P
2	*	*	*		*	*	*					*				*	63.6	3	P

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	32	853	115	.970	33	879	119
WB	34	941	103	.970	35	970	106
NB	99	182	33	.970	102	188	34
SB	168	269	28	.970	173	277	29

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	912	1	1.00	912	0.04	0.00
EB	RT	119	1	1.00	119	0.00	1.00
WB	LT-TH-RT	1111	1	1.00	1111	0.03	0.10
NB	LT-TH-RT	324	1	1.00	324	0.32	0.11
SB	LT-TH-RT	479	1	1.00	479	0.36	0.06

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	35	970	106	100	100	100	0	1	0	1076
WESTBOUND	33	879	119	100	100	0	0	1	1	879
NORTHBOUND	173	277	29	100	100	100	0	1	0	306
SOUTHBOUND	102	188	34	100	100	100	0	1	0	222

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	1	0.900	0.990	1.000	1.000	1.000	1.000	1.000	0.611	980
EB	RT	1800	1	0.867	0.990	1.000	1.000	1.000	1.000	0.802	1.000	1239
WB	LT-TH-RT	1800	1	1.100	0.990	1.000	1.000	1.000	1.000	0.883	0.778	1346
NB	LT-TH-RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.881	0.572	898
SB	LT-TH-RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.889	0.703	1077

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	100	64	1	912	998	33	0.04	1	1076	0.03
WB	100	64	1	1111	1076	35	0.03	1	879	0.04
NB	100	30	1	324	222	102	0.32	1	306	0.36
SB	100	30	1	479	306	173	0.36	1	222	0.32

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	1622	0.664	0.000	0.202	0.036	63.621	0.964	36.791	5.561	0.611	0.611
WB	1545	0.569	15.573	0.325	0.032	48.048	0.968	32.975	3.457	0.778	0.778
NB	1512	0.203	12.699	0.684	0.315	17.681	0.685	4.191	1.646	0.572	0.572
SB	1496	0.148	18.266	0.736	0.361	12.113	0.639	3.302	1.528	0.703	0.703

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH	912	980	0.93	0.64	623	1.46	*
EB	RT	119	1239	0.10	0.64	788	0.15	
WB	LT-TH-RT	1111	1346	0.83	0.64	856	1.30	
NB	LT-TH-RT	324	898	0.36	0.30	273	1.19	
SB	LT-TH-RT	479	1077	0.45	0.30	327	1.46	*

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 1.38 TOTAL V/C= 1.46

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH	1.46	0.64	100.0	73.08	623	358.08	1.00	431.16	F	113.9	328
EB	RT	0.15	0.64	100.0	5.56	788	0.01	1.00	5.57	B	1.2	1
WB	LT-TH-RT	1.30	0.64	100.0	28.86	856	184.78	1.00	213.64	F	71.6	199
NB	LT-TH-RT	1.19	0.30	100.0	28.81	273	124.45	1.00	153.26	F	16.9	42
SB	LT-TH-RT	1.46	0.30	100.0	33.19	327	371.81	1.00	405.00	F	58.6	163

DIR	Delay	LOS
EB	382.22	F
WB	213.64	F
NB	153.26	F
SB	405.00	F

INTERSECTION DELAY =297.15 INTERSECTION LOS=F

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
for chosen cycle length 100.0
suggested timing phase 1 is 30.4 secs green, 3.0 secs yellow + red clear
suggested timing phase 2 is 63.6 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
PARKER/RUGGLES
NO BUILD CONDITIONS - SAT PEAK HOUR
date:08-15-1989 time:05:05:26
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I8NBSAT GEOMETRICS=P18INT8E SIGNAL=P18INT8
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	7	502	35	0	1	1	0.0	9.0	8.0	28
WB	25	536	107	0	1	0	0.0	15.0	0.0	28
NB	45	118	36	0	1	0	0.0	12.0	0.0	20
SB	141	224	14	0	1	0	0.0	11.0	0.0	20

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.880	50	N	11.0	3
WB	0.0%	2.0%	N	0	0	.880	50	N	11.0	3
NB	0.0%	2.0%	N	10	0	.880	50	N	9.0	3
SB	0.0%	2.0%	Y	0	0	.880	50	N	9.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*	*	*	*		*	*	*		38.9	3	P
2	*	*	*		*	*	*					*				*	55.1	3	P

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	7	502	35	.880	8	570	40
WB	25	536	107	.880	28	609	122
NB	45	118	36	.880	51	134	41
SB	141	224	14	.880	160	255	16

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	578	1	1.00	578	0.01	0.00
EB	RT	40	1	1.00	40	0.00	1.00
WB	LT-TH-RT	759	1	1.00	759	0.04	0.16
NB	LT-TH-RT	226	1	1.00	226	0.23	0.18
SB	LT-TH-RT	431	1	1.00	431	0.37	0.04

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
BEING OPPOSED	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	28	609	122	100	100	100	0	1	0	731
WESTBOUND	8	570	40	100	100	0	0	1	1	570
NORTHBOUND	160	255	16	100	100	100	0	1	0	270
SOUTHBOUND	51	134	41	100	100	100	0	1	0	175

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	1	0.900	0.990	1.000	1.000	1.000	1.000	1.000	0.960	1539
EB	RT	1800	1	0.867	0.990	1.000	1.000	1.000	1.000	0.826	1.000	1276
WB	LT-TH-RT	1800	1	1.100	0.990	1.000	1.000	1.000	1.000	0.875	0.936	1604
NB	LT-TH-RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.871	0.791	1229
SB	LT-TH-RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.894	0.828	1276

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	100	55	1	578	610	8	0.01	1	731	0.04
WB	100	55	1	759	731	28	0.04	1	570	0.01
NB	100	39	1	226	175	51	0.23	1	270	0.37
SB	100	39	1	431	270	160	0.37	1	175	0.23

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	1718	0.425	21.810	0.418	0.014	33.260	0.986	29.503	2.689	0.960	0.960
WB	1759	0.324	33.507	0.518	0.037	21.563	0.963	17.344	2.170	0.936	0.936
NB	1532	0.176	25.843	0.706	0.226	13.088	0.774	5.566	1.594	0.791	0.791
SB	1587	0.110	31.362	0.766	0.372	7.569	0.628	2.796	1.469	0.828	0.828

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH	578	1539	0.38	0.55	848	0.68	
EB	RT	40	1276	0.03	0.55	703	0.06	
WB	LT-TH-RT	759	1604	0.47	0.55	883	0.86	*
NB	LT-TH-RT	226	1229	0.18	0.39	478	0.47	
SB	LT-TH-RT	431	1276	0.34	0.39	497	0.87	*

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.81 TOTAL V/C= 0.86

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH	0.68	0.55	100.0	12.29	848	1.58	1.00	13.87	B	7.2	8
EB	RT	0.06	0.55	100.0	7.92	703	0.00	1.00	7.92	B	0.5	1
WB	LT-TH-RT	0.86	0.55	100.0	14.56	883	6.05	1.00	20.62	C	9.5	14
NB	LT-TH-RT	0.47	0.39	100.0	17.37	478	0.57	1.00	17.94	C	3.8	4
SB	LT-TH-RT	0.87	0.39	100.0	21.40	497	10.50	1.00	31.90	D	7.5	12

DIR	Delay	LOS
EB	13.49	B
WB	20.62	C
NB	17.94	C
SB	31.90	D

INTERSECTION DELAY = 20.54 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 41.0 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 39.1 secs green, 3.0 secs yellow + red clear
suggested timing phase 2 is 54.9 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
COLUMBUS/MELNEA CASS/BUS DRIVE
NO BUILD CONDITIONS - AM PEAK HOUR
date:08-14-1989 time:06:28:24
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I9NBAM GEOMETRICS=P18I9 SIGNAL=P18I9
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	2	0	0	1	0	0.0	15.0	0.0	32
WB	29	21	760	0	1	1	0.0	12.0	12.0	26
NB	0	10	18	0	1	1	0.0	12.0	12.0	26
SB	0	286	9	0	2	0	0.0	12.0	0.0	52

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	%100.0%	N	0	0	.950	100	N	12.0	3
WB	0.0%	15.0%	N	0	0	.950	50	N	12.0	4
NB	0.0%	2.0%	N	10	0	.950	100	N	17.0	3
SB	0.0%	2.0%	Y	0	0	.950	100	N	17.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1							*					*		*	*		66.2	3	A
2				*				*		*	*						2.1	3	A
3	*	*	*		*	*	*					*				*	22.7	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	2	0	.950	0	2	0
WB	29	21	760	.950	31	22	800
NB	0	10	18	.950	0	11	19
SB	0	286	9	.950	0	301	9

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	2	1	1.00	2	0.00	0.00
WB	LT-TH	53	1	1.00	53	0.58	0.00
WB	RT	800	1	1.00	800	0.00	1.00
NB	TH	11	1	1.00	11	0.00	0.00
NB	RT	19	1	1.00	19	0.00	1.00
SB	TH-RT	311	2	1.05	326	0.00	0.03

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									OPPOSING
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			VOLUME
	LT	TH	RT	LT	TH	RT	LT	TH	RT	
WESTBOUND	0	2	0	100	100	100	0	1	0	2

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	1	1.100	0.667	1.000	1.000	1.000	1.000	1.000	1.000	1320
WB	LT-TH	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	1.000	0.995	1666
WB	RT	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	0.838	1.000	1403
NB	TH	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	1782
NB	RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.826	1.000	1472
SB	TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.995	1.000	3548

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
WB	100	23	1	53	822	31	0.58	1	2	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
WB	1800	0.001	22.651	0.874	0.580	0.090	0.420	0.056	1.288	0.995	0.995

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	2	1320	0.00	0.23	300	0.01	
WB	LT-TH	53	1666	0.03	0.23	379	0.14	
WB	RT	800	1403	0.57	0.92	1290	0.62	*
NB	TH	11	1782	0.01	0.02	37	0.28	
NB	RT	19	1472	0.01	0.02	31	0.62	*
SB	TH-RT	326	3548	0.09	0.66	2348	0.14	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.58 TOTAL V/C= 0.62

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.01	0.23	100.0	22.72	300	0.00	0.85	19.31	C	0.0	1
WB	LT-TH	0.14	0.23	100.0	23.42	379	0.01	0.62	14.53	B	1.1	1
WB	RT	0.62	0.92	100.0	0.58	1290	0.67	0.63	0.78	A	1.8	2
NB	TH	0.28	0.02	100.0	36.66	37	1.14	0.85	32.13	D	0.3	1
NB	RT	0.62	0.02	100.0	36.91	31	20.32	0.85	48.65	E	0.5	1
SB	TH-RT	0.14	0.66	100.0	4.79	2348	0.00	0.85	4.07	A	2.9	3

DIR	Delay	LOS
EB	19.31	C
WB	1.63	A
NB	42.75	E
SB	4.07	A

INTERSECTION DELAY = 3.32 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 15.5 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
COLUMBUS/MELNEA CASS/BUS DRIVE
NO BUILD CONDITIONS - PM PEAK HOUR
date:08-14-1989 time:06:35:18
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I9NBPM GEOMETRICS=P18I9 SIGNAL=P18I9
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	1	0	0	1	0	0.0	15.0	0.0	32
WB	26	24	298	0	1	1	0.0	12.0	12.0	26
NB	0	12	38	0	1	1	0.0	12.0	12.0	26
SB	0	783	35	0	2	0	0.0	12.0	0.0	52

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	%100.0%	N	0	0	.930	100	N	12.0	3
WB	0.0%	15.0%	N	0	0	.930	50	N	12.0	4
NB	0.0%	2.0%	N	10	0	.930	100	N	17.0	3
SB	0.0%	2.0%	Y	0	0	.930	100	N	17.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1							*					*		*	*		74.0	3	A
2				*				*			*	*					7.9	3	A
3	*	*	*		*	*	*					*				*	9.1	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	1	0	.930	0	1	0
WB	26	24	298	.930	28	26	320
NB	0	12	38	.930	0	13	41
SB	0	783	35	.930	0	842	38

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	1	1	1.00	1	0.00	0.00
WB	LT-TH	54	1	1.00	54	0.52	0.00
WB	RT	320	1	1.00	320	0.00	1.00
NB	TH	13	1	1.00	13	0.00	0.00
NB	RT	41	1	1.00	41	0.00	1.00
SB	TH-RT	880	2	1.05	924	0.00	0.04

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									OPPOSING
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			VOLUME
	LT	TH	RT	LT	TH	RT	LT	TH	RT	
WESTBOUND	0	1	0	100	100	100	0	1	0	1

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	1	1.100	0.667	1.000	1.000	1.000	1.000	1.000	1.000	1320
WB	LT-TH	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	1.000	1.000	1674
WB	RT	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	0.845	1.000	1415
NB	TH	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	1782
NB	RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.826	1.000	1472
SB	TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.994	1.000	3541

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
WB	100	9	1	54	346	28	0.52	1	1	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
WB	1800	0.001	9.058	0.874	0.520	0.054	0.480	0.036	1.287	1.000	1.000

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	1	1320	0.00	0.09	120	0.01	
WB	LT-TH	54	1674	0.03	0.09	153	0.35	*
WB	RT	320	1415	0.23	0.86	1218	0.26	
NB	TH	13	1782	0.01	0.08	140	0.09	
NB	RT	41	1472	0.03	0.08	116	0.35	*
SB	TH-RT	924	3541	0.26	0.74	2621	0.35	*

CYCLE=100.0 LOST= 9.0 SUM V/S CRIT= 0.32 TOTAL V/C= 0.35

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.01	0.09	100.0	31.42	120	0.00	0.85	26.70	D	0.0	1
WB	LT-TH	0.35	0.09	100.0	32.43	153	0.60	0.62	20.48	C	1.4	2
WB	RT	0.26	0.86	100.0	0.95	1218	0.03	0.62	0.60	A	1.2	1
NB	TH	0.09	0.08	100.0	32.49	140	0.01	0.85	27.62	D	0.3	1
NB	RT	0.35	0.08	100.0	33.17	116	0.78	0.85	28.86	D	1.0	2
SB	TH-RT	0.35	0.74	100.0	3.47	2621	0.04	0.85	2.98	A	6.3	6

DIR	Delay	LOS
EB	26.70	D
WB	3.46	A
NB	28.56	D
SB	2.98	A

INTERSECTION DELAY = 4.15 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 13.6 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
COLUMBUS/MELNEA CASS/BUS DRIVE
NO BUILD CONDITIONS - SAT PEAK HOUR
date:08-14-1989 time:06:37:17
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I9NBSAT GEOMETRICS=P18I9 SIGNAL=P18I9
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	1	0	0	1	0	0.0	15.0	0.0	32
WB	16	8	287	0	1	1	0.0	12.0	12.0	26
NB	0	7	51	0	1	1	0.0	12.0	12.0	26
SB	0	410	55	0	2	0	0.0	12.0	0.0	52

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	%100.0%	N	0	0	.950	100	N	12.0	3
WB	0.0%	15.0%	N	0	0	.950	50	N	12.0	4
NB	0.0%	2.0%	N	10	0	.950	100	N	17.0	3
SB	0.0%	2.0%	Y	0	0	.950	100	N	17.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1							*					*		*	*		70.1	3	A
2			*					*		*	*						13.7	3	A
3	*	*	*		*	*	*					*				*	7.2	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	1	0	.950	0	1	0
WB	16	8	287	.950	17	8	302
NB	0	7	51	.950	0	7	54
SB	0	410	55	.950	0	432	58

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	1	1	1.00	1	0.00	0.00
WB	LT-TH	25	1	1.00	25	0.67	0.00
WB	RT	302	1	1.00	302	0.00	1.00
NB	TH	7	1	1.00	7	0.00	0.00
NB	RT	54	1	1.00	54	0.00	1.00
SB	TH-RT	489	2	1.05	514	0.00	0.12

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	1	0	100	100	100	0	1	0	1

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	1	1.100	0.667	1.000	1.000	1.000	1.000	1.000	1.000	1320
WB	LT-TH	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	1.000	1.000	1674
WB	RT	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	0.846	1.000	1416
NB	TH	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	1782
NB	RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.826	1.000	1472
SB	TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.982	1.000	3501

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
WB	100	7	1	25	311	17	0.67	1	1	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
WB	1800	0.001	7.149	0.874	0.667	0.054	0.333	0.029	1.287	1.000	1.000

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	1	1320	0.00	0.07	95	0.01	
WB	LT-TH	25	1674	0.02	0.07	121	0.21	
WB	RT	302	1416	0.21	0.80	1137	0.27	*
NB	TH	7	1782	0.00	0.14	244	0.03	
NB	RT	54	1472	0.04	0.14	202	0.27	*
SB	TH-RT	514	3501	0.15	0.70	2454	0.21	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.25 TOTAL V/C= 0.27

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.01	0.07	100.0	32.75	95	0.00	0.85	27.84	D	0.0	1
WB	LT-TH	0.21	0.07	100.0	33.22	121	0.13	0.62	20.68	C	0.7	1
WB	RT	0.27	0.80	100.0	1.88	1137	0.03	0.62	1.18	A	1.7	2
NB	TH	0.03	0.14	100.0	28.41	244	0.00	0.85	24.15	C	0.2	1
NB	RT	0.27	0.14	100.0	29.36	202	0.17	0.85	25.10	D	1.3	2
SB	TH-RT	0.21	0.70	100.0	3.99	2454	0.01	0.85	3.39	A	4.1	4

DIR	Delay	LOS
EB	27.84	D
WB	2.69	A
NB	24.99	C
SB	3.39	A

INTERSECTION DELAY = 4.63 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 8.1 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
MELNEA CASS/WASHINGTON
NO BUILD CONDITIONS - AM PEAK HOUR
date:08-13-1989 time:00:31:02
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I12NNAM GEOMETRICS=P18INT12 SIGNAL=P18INT12
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	145	996	45	0	2	0	0.0	12.0	0.0	48
WB	57	988	29	0	2	0	0.0	12.0	0.0	48
NB	115	556	29	1	2	0	10.0	11.0	0.0	34
SB	15	188	25	1	2	0	10.0	11.0	0.0	34

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	8.0%	N	0	0	.880	100	N	16.0	3
WB	0.0%	8.0%	N	0	0	.880	100	N	16.0	3
NB	0.0%	12.0%	N	0	20	.880	100	N	12.5	3
SB	0.0%	12.0%	N	0	20	.880	100	N	12.5	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*									*				*	0.0	0	A
2	*	*	*		*	*	*					*				*	71.3	3	A
3				*				*					*	*	*		0.0	0	A
4				*				*	*	*	*		*	*	*		22.7	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	145	996	45	.880	165	1132	51
WB	57	988	29	.880	65	1123	33
NB	115	556	29	.880	131	632	33
SB	15	188	25	.880	17	214	28

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	1348	2	1.05	1415	0.12	0.04
WB	LT-TH-RT	1220	2	1.05	1281	0.05	0.03
NB	LT	131	1	1.00	131	1.00	0.00
NB	TH-RT	665	2	1.05	698	0.00	0.05
SB	LT	17	1	1.00	17	1.00	0.00
SB	TH-RT	242	2	1.05	254	0.00	0.12

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	65	1123	33	100	100	100	0	2	0	1220
WESTBOUND	165	1132	51	100	100	100	0	2	0	1348
NORTHBOUND	17	214	28	0	100	100	1	2	0	242
SOUTHBOUND	131	632	33	100	100	100	1	2	0	665

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	1.000	0.962	1.000	1.000	1.000	1.000	0.993	0.644	2212
WB	LT-TH-RT	1800	2	1.000	0.962	1.000	1.000	1.000	1.000	0.995	0.528	1819
NB	LT	1800	1	0.933	0.943	1.000	1.000	1.000	1.000	1.000	0.662	1049
NB	TH-RT	1800	2	0.967	0.943	1.000	1.000	0.958	1.000	0.990	1.000	3115
SB	LT	1800	1	0.933	0.943	1.000	1.000	1.000	1.000	1.000	0.950	1506
SB	TH-RT	1800	2	0.967	0.943	1.000	1.000	0.958	1.000	0.977	1.000	3073

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
WB	100	71	2	1220	1220	65	0.05	2	1348	0.12
NB	100	23	1	131	665	131	1.00	2	242	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
WB	1711	0.787	0.000	0.033	0.894	71.320	0.106	0.237	34.435	0.056	0.528
NB	3600	0.067	17.108	0.724	1.000	5.572	0.000	0.000	1.554	0.662	0.662

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH-RT	1415	2212	0.64	0.71	1577	0.90	
WB	LT-TH-RT	1281	1819	0.70	0.71	1297	0.99	*
NB	LT	131	1049	0.12	0.23	238	0.55	
NB	TH-RT	698	3115	0.22	0.23	707	0.99	*
SB	LT	17	1506	0.00	0.00	97	0.18	*
SB	TH-RT	254	3073	0.08	0.23	697	0.36	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.93 TOTAL V/C= 0.99

FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR 63 LEFT TURNS ON THE CHANGE INTERVAL AND 33 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH-RT	0.90	0.71	100.0	8.68	1577	5.21	0.85	11.81	B	10.7	14
WB	LT-TH-RT	0.99	0.71	100.0	10.59	1297	16.74	0.85	23.23	C	12.7	25
NB	LT	0.55	0.23	100.0	25.96	238	2.05	0.85	23.81	C	2.8	3
NB	TH-RT	0.99	0.23	100.0	29.28	707	23.31	0.85	44.70	E	15.4	26
SB	LT	0.18	0.23	100.0	23.66	97	0.09	1.00	23.75	C	0.5	1
SB	TH-RT	0.36	0.23	100.0	24.76	697	0.15	0.85	21.18	C	5.2	5

DIR	Delay	LOS
EB	11.81	B
WB	23.23	C
NB	41.41	E
SB	21.34	C

INTERSECTION DELAY = 22.80 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 267.2 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
MELNEA CASS/WASHINGTON
NO BUILD CONDITIONS - PM PEAK HOUR
date:08-13-1989 time:00:11:53
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I12NBAM GEOMETRICS=P18INT12 SIGNAL=P18INT12
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	138	1485	84	0	2	0	0.0	12.0	0.0	48
WB	78	1003	23	0	2	0	0.0	12.0	0.0	48
NB	97	425	49	1	2	0	10.0	11.0	0.0	34
SB	45	381	127	1	2	0	10.0	11.0	0.0	34

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	N	0	0	.970	100	N	16.0	3
WB	0.0%	3.0%	N	0	0	.970	100	N	16.0	3
NB	0.0%	8.0%	N	0	20	.970	100	N	12.5	3
SB	0.0%	8.0%	N	0	20	.970	100	N	12.5	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*									*				*	0.2	0	A
2	*	*	*		*	*	*					*				*	73.3	3	A
3				*				*					*	*	*		0.0	0	A
4				*				*	*	*	*		*	*	*		20.6	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	138	1485	84	.970	142	1531	87
WB	78	1003	23	.970	80	1034	24
NB	97	425	49	.970	100	438	51
SB	45	381	127	.970	46	393	131

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	1760	2	1.05	1848	0.08	0.05
WB	LT-TH-RT	1138	2	1.05	1195	0.07	0.02
NB	LT	100	1	1.00	100	1.00	0.00
NB	TH-RT	489	2	1.05	513	0.00	0.10
SB	LT	46	1	1.00	46	1.00	0.00
SB	TH-RT	524	2	1.05	550	0.00	0.25

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	80	1034	24	100	100	100	0	2	0	1138
WESTBOUND	142	1531	87	100	100	100	0	2	0	1399
NORTHBOUND	46	393	131	0	100	100	1	2	0	524
SOUTHBOUND	100	438	51	100	100	100	1	2	0	489

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	1.000	0.985	1.000	1.000	1.000	1.000	0.990	0.816	2866
WB	LT-TH-RT	1800	2	1.000	0.985	1.000	1.000	1.000	1.000	0.996	0.527	1863
NB	LT	1800	1	0.933	0.962	1.000	1.000	1.000	1.000	1.000	0.361	583
NB	TH-RT	1800	2	0.967	0.962	1.000	1.000	0.958	1.000	0.980	1.000	3141
SB	LT	1800	1	0.933	0.962	1.000	1.000	1.000	1.000	1.000	0.950	1535
SB	TH-RT	1800	2	0.967	0.962	1.000	1.000	0.958	1.000	0.951	1.000	3048

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
WB	100	73	2	1138	1138	80	0.07	2	1399	0.08
NB	100	21	1	100	489	100	1.00	2	524	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
WB	2441	0.573	37.378	0.001	1.000	35.892	0.000	0.000	1800.000	0.055	0.527
NB	3600	0.145	7.027	0.548	1.000	13.525	0.000	0.000	2.054	0.361	0.361

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH-RT	1848	2866	0.64	0.73	2105	0.88	*
WB	LT-TH-RT	1195	1863	0.64	0.73	1365	0.88	
NB	LT	100	583	0.17	0.21	120	0.83	
NB	TH-RT	513	3141	0.16	0.21	646	0.79	
SB	LT	46	1535	0.00	0.00	131	0.36	
SB	TH-RT	550	3048	0.18	0.21	626	0.88	*

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.83 TOTAL V/C= 0.88

FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR 65 LEFT TURNS ON THE CHANGE INTERVAL AND 66 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH-RT	0.88	0.73	100.0	7.54	2105	3.30	0.85	9.22	B	13.0	14
WB	LT-TH-RT	0.88	0.73	100.0	7.57	1365	4.77	0.85	10.49	B	8.5	11
NB	LT	0.83	0.21	100.0	28.95	120	24.89	0.85	45.77	E	2.4	5
NB	TH-RT	0.79	0.21	100.0	28.67	646	4.74	0.85	28.40	D	10.8	12
SB	LT	0.36	0.21	100.0	25.87	131	0.72	1.00	26.59	D	1.3	2
SB	TH-RT	0.88	0.21	100.0	29.26	626	9.47	0.85	32.92	D	11.6	15

DIR	Delay	LOS
EB	9.22	B
WB	10.49	B
NB	31.23	D
SB	32.43	D

INTERSECTION DELAY = 16.00 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 45.6 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
MELNEA CASS/WASHINGTON
NO BUILD CONDITIONS - SAT PEAK HOUR
date:08-17-1989 time:10:32:17
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I12NBS GEOMETRICS=P18I12 SIGNAL=P18I12
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	104	1114	63	0	2	0	0.0	12.0	0.0	48
WB	59	753	17	0	2	0	0.0	12.0	0.0	48
NB	97	425	49	1	2	0	10.0	11.0	0.0	34
SB	41	342	114	1	2	0	10.0	11.0	0.0	34

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	50	N	16.0	3
WB	0.0%	2.0%	N	0	0	.950	50	N	16.0	3
NB	0.0%	5.0%	N	0	15	.950	50	N	12.5	3
SB	0.0%	5.0%	N	0	15	.950	50	N	12.5	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*									*				*	0.0	0	A
2	*	*	*		*	*	*					*				*	70.2	3	A
3				*				*					*	*	*		0.0	0	A
4				*				*	*	*	*		*	*	*		23.8	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	104	1114	63	.950	109	1173	66
WB	59	753	17	.950	62	793	18
NB	97	425	49	.950	102	447	52
SB	41	342	114	.950	43	360	120

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	1348	2	1.05	1416	0.08	0.05
WB	LT-TH-RT	873	2	1.05	916	0.07	0.02
NB	LT	102	1	1.00	102	1.00	0.00
NB	TH-RT	499	2	1.05	524	0.00	0.10
SB	LT	43	1	1.00	43	1.00	0.00
SB	TH-RT	480	2	1.05	504	0.00	0.25

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	62	793	18	100	100	100	0	2	0	873
WESTBOUND	109	1173	66	100	100	100	0	2	0	1348
NORTHBOUND	43	360	120	0	100	100	1	2	0	480
SOUTHBOUND	102	447	52	100	100	100	1	2	0	499

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.991	0.914	3228
WB	LT-TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.996	0.539	1914
NB	LT	1800	1	0.933	0.976	1.000	1.000	1.000	1.000	1.000	0.427	701

```
NB  TH-RT     1800  2 0.967 0.976 1.000 1.000 0.969 1.000 0.982 1.000 3230
SB  LT        1800  1 0.933 0.976 1.000 1.000 1.000 1.000 1.000 0.950 1557
SB  TH-RT     1800  2 0.967 0.976 1.000 1.000 0.969 1.000 0.957 1.000 3146

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB 100  70  2  873  873   62 0.07  2 1348 0.08
NB 100  24  1  102  499  102 1.00  2  480 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf      El    Fm    Flt
WB 3010 0.448 46.030 0.032 0.906 24.178 0.094  0.207  34.898 0.078 0.539
NB 3600 0.133 12.070 0.575 1.000 11.722 0.000  0.000   1.956 0.427 0.427

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT  1416 3228 0.44 0.70 2267 0.62
WB  LT-TH-RT   916 1914 0.48 0.70 1344 0.68     *
NB  LT         102  701 0.15 0.24  167 0.61
NB  TH-RT      524 3230 0.16 0.24  768 0.68     *
SB  LT          43 1557 0.00 0.00  160 0.27     *
SB  TH-RT      504 3146 0.16 0.24  749 0.67

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.64 TOTAL V/C= 0.68
FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 66 LEFT TURNS ON THE CHANGE INTERVAL AND  95 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1    c     d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.62 0.70 100.0   6.01 2267   0.39 0.85    5.44   B  11.2    11
WB  LT-TH-RT 0.68 0.70 100.0   6.47 1344   1.01 0.85    6.36   B   7.2     7
NB  LT       0.61 0.24 100.0  25.84  167   4.52 0.85   25.80   D   2.2     3
NB  TH-RT    0.68 0.24 100.0  26.34  768   1.73 0.85   23.87   C  10.6    11
SB  LT       0.27 0.24 100.0  23.58  160   0.23 1.00   23.81   C   1.2     1
SB  TH-RT    0.67 0.24 100.0  26.28  749   1.67 0.85   23.76   C  10.2    10

DIR Delay LOS
EB   5.44  B
WB   6.36  B
NB  24.18  C
SB  23.76  C
INTERSECTION DELAY = 11.89 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  18.4 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
MELNEA CASS/MASSACHUSETTS/SOUTHHAMPTON/X-WAY RAMPS
NO BUILD CONDITIONS - AM PEAK HOUR
date:08-13-1989 time:04:21:27
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I13NBAM GEOMETRICS=P18I13 SIGNAL=P18I13
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	466	435	1	2	2	0	11.0	12.0	0.0	0
WB	273	953	0	1	3	0	12.0	12.0	0.0	0
NB	12	572	332	1	3	0	11.0	12.0	0.0	0
SB	273	702	946	1	2	2	10.0	12.0	10.0	0

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	N	0	0	.920	0	N	4.0	3
WB	0.0%	13.0%	N	0	0	.920	0	N	4.0	3
NB	0.0%	10.0%	N	0	0	.920	0	N	4.0	3
SB	0.0%	10.0%	N	0	0	.920	0	N	4.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*				*							*			*		20.7	0	A
2		*	*			*	*					*				*	25.2	3	A
3				*				*	*					*		*	21.9	0	A
4				*				*		*	*			*	*		26.2	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	466	435	1	.920	507	473	1
WB	273	953	0	.920	297	1036	0
NB	12	572	332	.920	13	622	361
SB	273	702	946	.920	297	763	1028

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	507	2	1.05	532	1.00	0.00
EB	TH-RT	474	2	1.05	498	0.00	0.00
WB	LT	297	1	1.00	297	1.00	0.00
WB	TH	1036	3	1.10	1139	0.00	0.00
NB	LT	13	1	1.00	13	1.00	0.00
NB	TH-RT	983	3	1.10	1081	0.00	0.37
SB	LT	297	1	1.00	297	1.00	0.00
SB	TH	763	2	1.05	801	0.00	0.00
SB	RT	1028	2	1.05	1080	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	297	1036	0	100	0	0	1	3	0	0

WESTBOUND	507	473	1	100	0	0	2	2	0	0	
NORTHBOUND	297	763	1028	100	0	0	1	2	2	0	
SOUTHBOUND	13	622	361	100	0	0	1	3	0	0	

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	2	0.967	0.985	1.000	1.000	1.000	1.000	1.000	0.920	3154
EB	TH-RT	1800	2	1.000	0.985	1.000	1.000	1.000	1.000	1.000	1.000	3546
WB	LT	1800	1	1.000	0.939	1.000	1.000	1.000	1.000	1.000	0.950	1606
WB	TH	1800	3	1.000	0.939	1.000	1.000	1.000	1.000	1.000	1.000	5070
NB	LT	1800	1	0.967	0.952	1.000	1.000	1.000	1.000	1.000	0.950	1574
NB	TH-RT	1800	3	1.000	0.952	1.000	1.000	1.000	1.000	0.945	1.000	4860
SB	LT	1800	1	0.933	0.952	1.000	1.000	1.000	1.000	1.000	0.950	1520
SB	TH	1800	2	1.000	0.952	1.000	1.000	1.000	1.000	1.000	1.000	3429
SB	RT	1800	2	0.933	0.952	1.000	1.000	1.000	1.000	0.750	1.000	2400

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT	532	3154	0.17	0.21	654	0.81	
EB	TH-RT	498	3546	0.14	0.25	893	0.56	
WB	LT	297	1606	0.18	0.21	333	0.89	*
WB	TH	1139	5070	0.22	0.25	1277	0.89	*
NB	LT	13	1574	0.01	0.22	345	0.04	
NB	TH-RT	1081	4860	0.22	0.26	1273	0.85	
SB	LT	297	1520	0.20	0.22	333	0.89	*
SB	TH	801	3429	0.23	0.26	898	0.89	*
SB	RT	1080	2400	0.45	0.69	1651	0.65	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.84 TOTAL V/C= 0.89

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.81	0.21	100.0	28.73	654	5.44	1.00	34.16	D	11.2	15
EB	TH-RT	0.56	0.25	100.0	24.74	893	0.60	0.85	21.53	C	9.8	10
WB	LT	0.89	0.21	100.0	29.30	333	17.28	1.00	46.58	E	7.1	12
WB	TH	0.89	0.25	100.0	27.43	1277	5.93	0.85	28.36	D	21.5	25
NB	LT	0.04	0.22	100.0	23.38	345	0.00	1.00	23.38	C	0.3	1
NB	TH-RT	0.85	0.26	100.0	26.62	1273	3.98	0.85	26.01	D	20.1	22
SB	LT	0.89	0.22	100.0	28.81	333	17.28	1.00	46.09	E	7.0	12
SB	TH	0.89	0.26	100.0	27.01	898	7.98	0.85	29.74	D	15.6	20
SB	RT	0.65	0.69	100.0	6.72	1651	0.67	0.85	6.28	B	8.9	9

DIR	Delay	LOS
EB	28.06	D
WB	32.12	D
NB	25.98	D
SB	20.34	C

INTERSECTION DELAY = 25.75 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 51.1 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
MELNEA CASS/MASSACHUSETTS/SOUTHHAMPTON/X-WAY RAMPS
NO BUILD CONDITIONS - PM PEAK HOUR
date:08-13-1989 time:04:36:14
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I13NBPM GEOMETRICS=P18I13 SIGNAL=P18I13
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	764	398	2	2	2	0	11.0	12.0	0.0	0
WB	365	435	0	1	3	0	12.0	12.0	0.0	0
NB	20	635	381	1	3	0	11.0	12.0	0.0	0
SB	205	846	676	1	2	2	10.0	12.0	10.0	0

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT MIN TIME	TYPE
EB	0.0%	3.0%	N	0	0	.930	0	N 4.0	3
WB	0.0%	13.0%	N	0	0	.930	0	N 4.0	3
NB	0.0%	10.0%	N	0	0	.930	0	N 4.0	3
SB	0.0%	10.0%	N	0	0	.930	0	N 4.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*				*							*			*		31.2	0	A
2		*	*			*	*					*				*	14.5	3	A
3				*				*	*				*		*		16.5	0	A
4				*				*		*	*			*	*		31.8	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	764	398	2	.930	822	428	2
WB	365	435	0	.930	392	468	0
NB	20	635	381	.930	22	683	410
SB	205	846	676	.930	220	910	727

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	822	2	1.05	863	1.00	0.00
EB	TH-RT	430	2	1.05	452	0.00	0.01
WB	LT	392	1	1.00	392	1.00	0.00
WB	TH	468	3	1.10	515	0.00	0.00
NB	LT	22	1	1.00	22	1.00	0.00
NB	TH-RT	1092	3	1.10	1202	0.00	0.38
SB	LT	220	1	1.00	220	1.00	0.00
SB	TH	910	2	1.05	955	0.00	0.00
SB	RT	727	2	1.05	763	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	392	468	0	100	0	0	1	3	0	0

WESTBOUND	822	428	2	100	0	0	2	2	0	0
NORTHBOUND	220	910	727	100	0	0	1	2	2	0
SOUTHBOUND	22	683	410	100	0	0	1	3	0	0

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	2	0.967	0.985	1.000	1.000	1.000	1.000	1.000	0.920	3154
EB	TH-RT	1800	2	1.000	0.985	1.000	1.000	1.000	1.000	0.999	1.000	3544
WB	LT	1800	1	1.000	0.939	1.000	1.000	1.000	1.000	1.000	0.950	1606
WB	TH	1800	3	1.000	0.939	1.000	1.000	1.000	1.000	1.000	1.000	5070
NB	LT	1800	1	0.967	0.952	1.000	1.000	1.000	1.000	1.000	0.950	1574
NB	TH-RT	1800	3	1.000	0.952	1.000	1.000	1.000	1.000	0.944	1.000	4854
SB	LT	1800	1	0.933	0.952	1.000	1.000	1.000	1.000	1.000	0.950	1520
SB	TH	1800	2	1.000	0.952	1.000	1.000	1.000	1.000	1.000	1.000	3429
SB	RT	1800	2	0.933	0.952	1.000	1.000	1.000	1.000	0.750	1.000	2400

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT	863	3154	0.27	0.31	983	0.88	*
EB	TH-RT	452	3544	0.13	0.15	515	0.88	*
WB	LT	392	1606	0.24	0.31	501	0.78	
WB	TH	515	5070	0.10	0.15	737	0.70	
NB	LT	22	1574	0.01	0.17	260	0.08	
NB	TH-RT	1202	4854	0.25	0.32	1542	0.78	
SB	LT	220	1520	0.15	0.17	251	0.88	*
SB	TH	955	3429	0.28	0.32	1089	0.88	*
SB	RT	763	2400	0.32	0.79	1907	0.40	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.82 TOTAL V/C= 0.88

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.88	0.31	100.0	24.77	983	6.45	1.00	31.23	D	15.7	22
EB	TH-RT	0.88	0.15	100.0	31.82	515	11.04	0.85	36.42	D	10.2	14
WB	LT	0.78	0.31	100.0	23.82	501	5.51	1.00	29.33	D	7.5	11
WB	TH	0.70	0.15	100.0	30.90	737	2.04	0.85	28.00	D	11.1	12
NB	LT	0.08	0.17	100.0	26.84	260	0.00	1.00	26.84	D	0.5	1
NB	TH-RT	0.78	0.32	100.0	23.52	1542	1.85	0.85	21.57	C	20.7	21
SB	LT	0.88	0.17	100.0	30.96	251	19.10	1.00	50.06	E	5.6	10
SB	TH	0.88	0.32	100.0	24.53	1089	5.91	0.85	25.87	D	17.2	21
SB	RT	0.40	0.79	100.0	2.35	1907	0.08	0.85	2.06	A	4.1	4

DIR	Delay	LOS
EB	33.01	D
WB	28.57	D
NB	21.66	C
SB	19.25	C

INTERSECTION DELAY = 24.73 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 45.4 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
MELNEA CASS/MASSACHUSETTS/SOUTHHAMPTON/X-WAY RAMPS
NO BUILD CONDITIONS - SAT PEAK HOUR
date:08-17-1989 time:11:23:01
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I13NBS GEOMETRICS=P18I13 SIGNAL=P18I13
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	573	298	2	2	2	0	11.0	12.0	0.0	0
WB	273	327	0	1	3	0	12.0	12.0	0.0	0
NB	16	477	286	1	3	0	11.0	12.0	0.0	0
SB	154	635	490	1	2	2	10.0	12.0	10.0	0

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.920	0	N	4.0	3
WB	0.0%	5.0%	N	0	0	.920	0	N	4.0	3
NB	0.0%	2.0%	N	0	0	.920	0	N	4.0	3
SB	0.0%	2.0%	N	0	0	.920	0	N	4.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*				*							*			*		31.7	0	A
2		*	*			*	*					*				*	14.8	3	A
3				*				*	*					*		*	16.3	0	A
4				*				*		*	*			*		*	31.2	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	573	298	2	.920	623	324	2
WB	273	327	0	.920	297	355	0
NB	16	477	286	.920	17	518	311
SB	154	635	490	.920	167	690	533

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	623	2	1.05	654	1.00	0.00
EB	TH-RT	326	2	1.05	342	0.00	0.01
WB	LT	297	1	1.00	297	1.00	0.00
WB	TH	355	3	1.10	391	0.00	0.00
NB	LT	17	1	1.00	17	1.00	0.00
NB	TH-RT	829	3	1.10	912	0.00	0.37
SB	LT	167	1	1.00	167	1.00	0.00
SB	TH	690	2	1.05	725	0.00	0.00
SB	RT	533	2	1.05	559	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	297	355	0	100	0	0	1	3	0	0

WESTBOUND	623	324	2	100	0	0	2	2	0	0
NORTHBOUND	167	690	533	100	0	0	1	2	2	0
SOUTHBOUND	17	518	311	100	0	0	1	3	0	0

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.920	3170
EB	TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.999	1.000	3561
WB	LT	1800	1	1.000	0.976	1.000	1.000	1.000	1.000	1.000	0.950	1668
WB	TH	1800	3	1.000	0.976	1.000	1.000	1.000	1.000	1.000	1.000	5268
NB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1637
NB	TH-RT	1800	3	1.000	0.990	1.000	1.000	1.000	1.000	0.944	1.000	5046
SB	LT	1800	1	0.933	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1580
SB	TH	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3564
SB	RT	1800	2	0.933	0.990	1.000	1.000	1.000	1.000	0.750	1.000	2495

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT	654	3170	0.21	0.32	1005	0.65	*
EB	TH-RT	342	3561	0.10	0.15	526	0.65	*
WB	LT	297	1668	0.18	0.32	529	0.56	
WB	TH	391	5268	0.07	0.15	778	0.50	
NB	LT	17	1637	0.01	0.16	266	0.07	
NB	TH-RT	912	5046	0.18	0.31	1577	0.58	
SB	LT	167	1580	0.11	0.16	257	0.65	*
SB	TH	725	3564	0.20	0.31	1114	0.65	*
SB	RT	559	2495	0.22	0.79	1977	0.28	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.61 TOTAL V/C= 0.65

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.65	0.32	100.0	22.33	1005	1.06	1.00	23.40	C	11.8	13
EB	TH-RT	0.65	0.15	100.0	30.54	526	2.00	0.85	27.65	D	7.7	8
WB	LT	0.56	0.32	100.0	21.56	529	1.03	1.00	22.59	C	5.6	6
WB	TH	0.50	0.15	100.0	29.81	778	0.45	0.85	25.72	D	8.4	9
NB	LT	0.07	0.16	100.0	26.92	266	0.00	1.00	26.92	D	0.4	1
NB	TH-RT	0.58	0.31	100.0	21.93	1577	0.40	0.85	18.98	C	15.8	16
SB	LT	0.65	0.16	100.0	29.79	257	3.94	1.00	33.73	D	3.9	6
SB	TH	0.65	0.31	100.0	22.55	1114	0.96	0.85	19.98	C	13.2	13
SB	RT	0.28	0.79	100.0	2.11	1977	0.02	0.85	1.82	A	3.1	3

DIR	Delay	LOS
EB	24.86	C
WB	24.37	C
NB	19.13	C
SB	14.57	B

INTERSECTION DELAY = 19.79 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 16.8 SECONDS
THE EXISTING TIMING IS OPTIMAL

Level of Service Calculations:

No Build (1996) Conditions
With No Build Improvements
(AM, PM and SAT peak hours)

- Tremont/Melnea Cass
- Huntington/Ruggles
- Parker/Ruggles
- Melnea Cass/Washington

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
NO BUILD CONDITIONS (W/IMPROVEMENTS - EB DBL TH) - AM PEAK HOUR
date:08-22-1989 time:12:09:24
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2NBAM GEOMETRICS=P18I2MT SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	5	72	254	0	2	1	0.0	11.0	11.0	44
WB	0	1447	68	0	3	0	0.0	11.0	0.0	49
NB	583	923	0	1	2	0	11.0	11.0	0.0	56
SB	62	498	1	0	3	0	0.0	11.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	50	N	16.3	4
WB	0.0%	2.0%	N	0	0	.950	50	N	16.3	3
NB	0.0%	2.0%	N	0	0	.950	50	N	15.0	4
SB	0.0%	2.0%	N	0	0	.950	50	N	15.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							36.2	0	A
2				*				*	*	*			*	*	*		15.0	3	A
3						*	*					*				*	37.1	3	A
4	*	*	*									*				*	2.7	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	5	72	254	.950	5	76	267
WB	0	1447	68	.950	0	1523	72
NB	583	923	0	.950	614	972	0
SB	62	498	1	.950	65	524	1

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	81	2	1.05	85	0.06	0.00
EB	RT	267	1	1.00	267	0.00	1.00
WB	TH-RT	1595	3	1.10	1754	0.00	0.04
NB	LT	614	1	1.00	614	1.00	0.00
NB	TH	972	2	1.05	1020	0.00	0.00
SB	LT-TH-RT	591	3	1.10	650	0.11	0.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	1523	72	0	0	0	0	3	0	0
NORTHBOUND	65	524	1	100	100	100	0	3	0	591
SOUTHBOUND	614	972	0	0	29	0	1	2	0	285

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.989	3407
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.848	1.000	1461
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.992	1.000	5128
NB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1637

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NB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3446
SB  LT-TH-RT  1800  3 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.914 4722

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
SB 100  15  3  591  591   65 0.11  2  285 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf     El    Fm   Flt
SB 3600 0.079  7.692 0.697 0.447  7.301 0.553  2.193  1.614 0.742 0.914

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH      85 3407 0.02 0.03   92 0.92     *
EB  RT        267 1461 0.18 0.39  568 0.47
WB  TH-RT    1754 5128 0.34 0.37 1904 0.92     *
NB  LT        614 1637 0.34 0.36  663 0.93     *
NB  TH       1020 3446 0.30 0.51 1763 0.58
SB  LT-TH-RT  650 4722 0.14 0.15  708 0.92     *

CYCLE=100.0  LOST= 9.0  SUM V/S CRIT= 0.84 TOTAL V/C= 0.92
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  2 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1    c     d2    PF   Delay LOS Avg Q  95% Q
EB  LT-TH    0.92 0.03 100.0 36.89   92  48.24 0.75   64.23  F   2.5     5
EB  RT       0.47 0.39 100.0 17.38  568   0.47 0.62   11.07  B   4.5     5
WB  TH-RT    0.92 0.37 100.0 22.83 1904   5.78 0.85   24.32  C  27.9    33
NB  LT       0.93 0.51 100.0 17.23  663  13.81 1.00   31.04  D  10.9    17
NB  TH       0.58 0.51 100.0 12.88 1763   0.36 0.62    8.21  B  13.2    13
SB  LT-TH-RT 0.92 0.15 100.0 31.84  708  12.16 0.85   37.40  D  13.9    19

DIR Delay LOS
EB  23.90  C
WB  24.32  C
NB  16.78  C
SB  37.40  D
INTERSECTION DELAY = 23.42 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  77.5 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  36.3 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  14.9 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  37.1 secs green,   3.0 secs yellow + red clear
suggested timing phase 4 is   2.7 secs green,   3.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
NO BUILD CONDITIONS (W/IMPROVEMENTS - EB DBL RGT) - PM PEAK HOUR
date:08-15-1989 time:04:36:22
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2NBPM GEOMETRICS=P18I2MR SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	249	563	0	1	2	0.0	11.0	11.0	44
WB	0	1581	51	0	3	0	0.0	11.0	0.0	49
NB	398	686	0	1	2	0	11.0	11.0	0.0	56
SB	81	611	17	0	3	0	0.0	11.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.930	50	N 16.3	4
WB	0.0%	2.0%	N	0	0	.930	50	N 16.3	3
NB	0.0%	2.0%	N	0	0	.930	50	N 15.0	4
SB	0.0%	2.0%	N	0	0	.930	50	N 15.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							20.9	0	A
2				*				*	*	*			*	*	*		18.0	3	A
3						*	*					*				*	36.8	3	A
4	*	*	*									*				*	15.2	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	249	563	.930	0	268	605
WB	0	1581	51	.930	0	1700	55
NB	398	686	0	.930	428	738	0
SB	81	611	17	.930	87	657	18

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	268	1	1.00	268	0.00	0.00
EB	RT	605	2	1.05	636	0.00	1.00
WB	TH-RT	1755	3	1.10	1930	0.00	0.03
NB	LT	428	1	1.00	428	1.00	0.00
NB	TH	738	2	1.05	775	0.00	0.00
SB	LT-TH-RT	762	3	1.10	839	0.11	0.02

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
NORTHBOUND	87	657	18	100	100	100	0	3	0	762
SOUTHBOUND	428	738	0	0	46	0	1	2	0	342

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	1.000	1723
EB	RT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	0.750	1.000	2584
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.995	1.000	5140
NB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1637
NB	TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3446

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SB  LT-TH-RT  1800  3 0.967 0.990 1.000 1.000 1.000 1.000 0.996 0.887 4563

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
SB 100  18  3  762  762   87 0.11  2  342 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
SB 3600 0.095  9.440 0.661 0.498  8.604 0.502  1.912    1.701 0.660 0.887

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH        268 1723 0.16 0.15  263 1.02     *
EB  RT        636 2584 0.25 0.36  933 0.68
WB  TH-RT    1930 5140 0.38 0.37 1894 1.02     *
NB  LT        428 1637 0.21 0.21  419 1.02     *
NB  TH        775 3446 0.22 0.39 1341 0.58
SB  LT-TH-RT  839 4563 0.18 0.18  823 1.02     *

CYCLE=100.0  LOST= 9.0  SUM V/S CRIT= 0.93 TOTAL V/C= 1.02
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  8 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c     d2    PF   Delay LOS Avg Q  95% Q
EB  TH       1.02 0.15 100.0 32.32  263  48.40 0.79   63.38  F   7.9    15
EB  RT       0.68 0.36 100.0 20.57  933   1.43 0.66   14.52  B  10.7    11
WB  TH-RT    1.02 0.37 100.0 24.27 1894  20.52 0.85   38.07  D  34.0    57
NB  LT       1.02 0.39 100.0 23.54  419  39.75 1.00   63.28  F  12.2    24
NB  TH       0.58 0.39 100.0 18.29 1341   0.47 0.62   11.63  B  12.5    13
SB  LT-TH-RT 1.02 0.18 100.0 31.27  823  28.80 0.85   51.06  E  19.5    33

DIR Delay LOS
EB  29.00  D
WB  38.07  D
NB  30.01  D
SB  51.06  E
INTERSECTION DELAY = 36.64 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 387.0 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  20.9 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  18.0 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  36.8 secs green,   3.0 secs yellow + red clear
suggested timing phase 4 is  15.2 secs green,   3.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
NO BUILD CONDITIONS (W/IMPROVEMENTS - EB DBL RGT) - SAT PEAK HOUR
date:08-22-1989 time:11:57:54
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2NBSAT GEOMETRICS=P18I2MR SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	7	77	351	0	1	2	0.0	11.0	11.0	44
WB	0	918	118	0	3	0	0.0	11.0	0.0	49
NB	283	880	0	1	2	0	11.0	11.0	0.0	56
SB	92	576	28	0	3	0	0.0	11.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	25	N	16.3	4
WB	0.0%	2.0%	N	0	0	.950	25	N	16.3	3
NB	0.0%	2.0%	N	0	0	.950	25	N	15.0	4
SB	0.0%	2.0%	N	0	0	.950	25	N	15.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							18.4	0	A
2				*				*	*	*			*	*	*		28.7	3	A
3						*	*					*				*	35.2	3	A
4	*	*	*									*				*	8.6	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	7	77	351	.950	7	81	369
WB	0	918	118	.950	0	966	124
NB	283	880	0	.950	298	926	0
SB	92	576	28	.950	97	606	29

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	88	1	1.00	88	0.08	0.00
EB	RT	369	2	1.05	388	0.00	1.00
WB	TH-RT	1091	3	1.10	1200	0.00	0.11
NB	LT	298	1	1.00	298	1.00	0.00
NB	TH	926	2	1.05	973	0.00	0.00
SB	LT-TH-RT	733	3	1.10	806	0.13	0.04

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	966	124	0	0	0	0	3	0	0
NORTHBOUND	97	606	29	100	100	100	0	3	0	733
SOUTHBOUND	298	926	0	0	61	0	1	2	0	564

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.888	1529
EB	RT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	0.750	1.000	2584
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.982	1.000	5073
NB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1637

```
NB  TH         1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3446
SB  LT-TH-RT   1800  3 0.967 0.990 1.000 1.000 1.000 1.000 0.993 0.812 4172

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
SB 100  29  3  733  733   97 0.13  2  564 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf      El    Fm   Flt
SB 3600 0.157 15.464 0.523 0.735 13.243 0.265  0.719   2.153 0.437 0.812

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH      88 1529 0.06 0.09  132 0.67     *
EB  RT        388 2584 0.15 0.27  699 0.55
WB  TH-RT    1200 5073 0.24 0.35 1787 0.67     *
NB  LT        298 1637 0.12 0.18  450 0.66     *
NB  TH        973 3446 0.28 0.47 1625 0.60
SB  LT-TH-RT  806 4172 0.19 0.29 1198 0.67     *

CYCLE=100.0  LOST= 9.0  SUM V/S CRIT= 0.61 TOTAL V/C= 0.67
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  79 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1     c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH    0.67 0.09 100.0 33.68  132    8.31 0.66   27.52  D   2.2    3
EB  RT       0.55 0.27 100.0 23.79  699    0.75 0.62   15.21  C   7.5    7
WB  TH-RT    0.67 0.35 100.0 20.88 1787    0.70 0.85   18.34  C  19.6   20
NB  LT       0.66 0.47 100.0 15.43  450    2.51 1.00   17.94  C   6.7    7
NB  TH       0.60 0.47 100.0 14.79 1625    0.45 0.62    9.45  B  13.6   14
SB  LT-TH-RT 0.67 0.29 100.0 23.94 1198    1.05 0.85   21.24  C  14.5   15

DIR Delay LOS
EB  17.50  C
WB  18.34  C
NB  11.44  B
SB  21.24  C
INTERSECTION DELAY = 16.52 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  25.1 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  18.2 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  28.8 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  35.3 secs green,   3.0 secs yellow + red clear
suggested timing phase 4 is   8.6 secs green,   3.0 secs yellow + red clear
```

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
HUNTINGTON/RUGGLES
NO BUILD CONDITIONS (W/IMPROVEMENTS) - AM PEAK HOUR
date:08-13-1989 time:21:53:26
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I6NBAM GEOMETRICS=P18INT6M SIGNAL=P18INT6M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	478	12	0	2	0	0.0	10.0	0.0	29
WB	191	741	16	1	1	0	10.0	14.0	0.0	29
NB	0	679	285	0	2	1	0.0	10.0	9.0	49
SB	0	643	137	0	2	1	0.0	10.0	9.0	48

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.910	200	N	11.3	3
WB	0.0%	2.0%	N	2	0	.910	200	N	11.3	3
NB	0.0%	2.0%	N	0	10	.910	200	N	16.3	3
SB	0.0%	2.0%	N	0	10	.910	200	N	16.3	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*		*	*			*	*		32.8	3	A
2					*	*	*				*					*	15.0	0	A
3		*	*		*	*	*					*				*	46.2	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	478	12	.910	0	525	13
WB	191	741	16	.910	210	814	18
NB	0	679	285	.910	0	746	313
SB	0	643	137	.910	0	707	151

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH-RT	538	2	1.05	565	0.00	0.02
WB	LT	210	1	1.00	210	1.00	0.00
WB	TH-RT	832	1	1.00	832	0.00	0.02
NB	TH	746	2	1.05	783	0.00	0.00
NB	RT	313	1	1.00	313	0.00	1.00
SB	TH	707	2	1.05	742	0.00	0.00
SB	RT	151	1	1.00	151	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	525	13	100	100	100	0	2	0	538

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH-RT	1800	2	0.933	0.990	1.000	1.000	1.000	1.000	0.994	1.000	3307
WB	LT	1800	1	0.933	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1580
WB	TH-RT	1800	1	1.067	0.990	1.000	1.000	1.000	1.000	0.995	1.000	1891
NB	TH	1800	2	0.933	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3327
NB	RT	1800	1	0.900	0.990	1.000	1.000	0.958	1.000	0.785	1.000	1206
SB	TH	1800	2	0.933	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3327

```
SB  RT        1800  1 0.900 0.990 1.000 1.000 0.958 1.000 0.755 1.000 1160

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH-RT     565 3307 0.17 0.46 1529 0.37
WB  LT        210 1580 0.05 0.15  596 0.35
WB  TH-RT     832 1891 0.44 0.61 1158 0.72     *
NB  TH        783 3327 0.24 0.33 1090 0.72     *
NB  RT        313 1206 0.26 0.48  576 0.54
SB  TH        742 3327 0.22 0.33 1090 0.68
SB  RT        151 1160 0.13 0.33  380 0.40

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.68 TOTAL V/C= 0.72
FOR THE WESTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  293 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH-RT    0.37 0.46 100.0 13.24 1529   0.07 0.85   11.32  B   8.0    8
WB  LT       0.35 0.61 100.0  7.28  596   0.16 1.00    7.44  B   5.0    5
WB  TH-RT    0.72 0.61 100.0 10.20 1158   1.53 0.85    9.97  B   9.0    9
NB  TH       0.72 0.33 100.0 22.46 1090   1.62 0.85   20.47  C  13.9   14
NB  RT       0.54 0.48 100.0 14.01  576   0.83 0.85   12.62  B   4.5    5
SB  TH       0.68 0.33 100.0 22.10 1090   1.22 0.85   19.82  C  13.2   13
SB  RT       0.40 0.33 100.0 19.73  380   0.37 0.85   17.09  C   2.8    3

DIR Delay LOS
EB  11.32  B
WB   9.46  B
NB  18.23  C
SB  19.36  C
INTERSECTION DELAY = 14.88 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  20.8 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  32.8 secs green,   3.0 secs yellow + red clear
suggested timing phase 2 is  14.4 secs green,   0.0 secs yellow + red clear
suggested timing phase 3 is  46.8 secs green,   3.0 secs yellow + red clear
```

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
HUNTINGTON/RUGGLES
NO BUILD CONDITIONS (W/IMPROVEMENTS) - PM PEAK HOUR
date:08-13-1989 time:22:00:16
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I6NBPM GEOMETRICS=P18INT6M SIGNAL=P18INT6M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	541	41	0	2	0	0.0	10.0	0.0	29
WB	354	728	71	1	1	0	10.0	14.0	0.0	29
NB	0	887	543	0	2	1	0.0	10.0	9.0	49
SB	0	859	102	0	2	1	0.0	10.0	9.0	48

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK				PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.820	200	N	11.3	3
WB	0.0%	2.0%	N	0	0	.820	200	N	11.3	3
NB	0.0%	2.0%	N	0	10	.820	200	N	16.3	3
SB	0.0%	2.0%	N	0	10	.820	200	N	16.3	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*		*	*			*	*		37.1	3	A
2					*	*	*				*					*	26.6	0	A
3		*	*		*	*	*					*				*	30.4	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	541	41	.820	0	660	50
WB	354	728	71	.820	432	888	87
NB	0	887	543	.820	0	1082	662
SB	0	859	102	.820	0	1048	124

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH-RT	710	2	1.05	745	0.00	0.07
WB	LT	432	1	1.00	432	1.00	0.00
WB	TH-RT	974	1	1.00	974	0.00	0.09
NB	TH	1082	2	1.05	1136	0.00	0.00
NB	RT	662	1	1.00	662	0.00	1.00
SB	TH	1048	2	1.05	1100	0.00	0.00
SB	RT	124	1	1.00	124	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	660	50	100	100	100	0	2	0	710

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH-RT	1800	2	0.933	0.990	1.000	1.000	1.000	1.000	0.983	1.000	3269
WB	LT	1800	1	0.933	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1580
WB	TH-RT	1800	1	1.067	0.990	1.000	1.000	1.000	1.000	0.978	1.000	1860
NB	TH	1800	2	0.933	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3327
NB	RT	1800	1	0.900	0.990	1.000	1.000	0.958	1.000	0.795	1.000	1221
SB	TH	1800	2	0.933	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3327

```
SB  RT        1800  1 0.900 0.990 1.000 1.000 0.958 1.000 0.755 1.000 1160

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH-RT     745 3269 0.23 0.30  992 0.75
WB  LT        432 1580 0.20 0.27  571 0.76
WB  TH-RT     974 1860 0.52 0.57 1058 0.92     *
NB  TH       1136 3327 0.34 0.37 1234 0.92     *
NB  RT        662 1221 0.54 0.64  777 0.85
SB  TH       1100 3327 0.33 0.37 1234 0.89
SB  RT        124 1160 0.11 0.37  430 0.29

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.87 TOTAL V/C= 0.92
FOR THE WESTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  85 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH-RT    0.75 0.30 100.0  23.88  992    2.27 0.85   22.22  C  13.7   14
WB  LT       0.76 0.57 100.0  12.39  571    3.98 1.00   16.36  C   8.8    9
WB  TH-RT    0.92 0.57 100.0  14.82 1058    9.21 0.85   20.43  C  11.7   18
NB  TH       0.92 0.37 100.0  22.84 1234    8.17 0.85   26.35  D  18.9   25
NB  RT       0.85 0.64 100.0  10.97  777    6.35 0.85   14.72  B   6.7    9
SB  TH       0.89 0.37 100.0  22.47 1234    6.09 0.85   24.28  C  18.3   22
SB  RT       0.29 0.37 100.0  16.85  430    0.11 0.85   14.41  B   2.2    2

DIR Delay LOS
EB  22.22  C
WB  19.18  C
NB  22.07  C
SB  23.28  C
INTERSECTION DELAY = 21.59 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  67.4 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  37.1 secs green,   3.0 secs yellow + red clear
suggested timing phase 2 is  26.7 secs green,   0.0 secs yellow + red clear
suggested timing phase 3 is  30.3 secs green,   3.0 secs yellow + red clear
```

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
HUNTINGTON/RUGGLES
NO BUILD CONDITIONS (W/IMPROVEMENTS) - SAT PEAK HOUR
date:08-13-1989 time:22:21:14
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I6NBSAT GEOMETRICS=P18INT6M SIGNAL=P18INT6M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	61	340	34	0	2	0	0.0	10.0	0.0	29
WB	150	406	32	1	1	0	10.0	14.0	0.0	29
NB	0	913	198	0	2	1	0.0	10.0	9.0	49
SB	0	877	133	0	2	1	0.0	10.0	9.0	48

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.940	100	N	11.3	3
WB	0.0%	2.0%	N	2	0	.940	100	N	11.3	3
NB	0.0%	2.0%	N	0	10	.940	200	N	16.3	3
SB	0.0%	2.0%	N	0	10	.940	200	N	16.3	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*		*	*			*	*		51.8	3	A
2					*	*	*				*					*	3.3	0	A
3	*	*	*		*	*	*					*				*	38.9	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	61	340	34	.940	65	362	36
WB	150	406	32	.940	160	432	34
NB	0	913	198	.940	0	971	211
SB	0	877	133	.940	0	933	141

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	463	2	1.05	486	0.14	0.08
WB	LT	160	1	1.00	160	1.00	0.00
WB	TH-RT	466	1	1.00	466	0.00	0.07
NB	TH	971	2	1.05	1020	0.00	0.00
NB	RT	211	1	1.00	211	0.00	1.00
SB	TH	933	2	1.05	980	0.00	0.00
SB	RT	141	1	1.00	141	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	160	432	34	0	92	92	1	1	0	429
WESTBOUND	65	362	36	100	100	100	0	2	0	463

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	0.933	0.990	1.000	1.000	1.000	1.000	0.981	0.747	2439
WB	LT	1800	1	0.933	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1580
WB	TH-RT	1800	1	1.067	0.990	1.000	1.000	1.000	1.000	0.982	1.000	1867
NB	TH	1800	2	0.933	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3327
NB	RT	1800	1	0.900	0.990	1.000	1.000	0.958	1.000	0.805	1.000	1238
SB	TH	1800	2	0.933	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3327

```
SB  RT        1800  1 0.900 0.990 1.000 1.000 0.958 1.000 0.802 1.000 1233

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
EB 100  39  2  463  463   65 0.14  1  429 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf      El    Fm   Flt
EB 1800 0.239 19.729 0.607 0.471 19.152 0.529  2.238   1.855 0.495 0.747

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT  486 2439 0.20 0.39  948 0.51
WB  LT        160 1580 0.01 0.03  366 0.44
WB  TH-RT     466 1867 0.25 0.42  788 0.59     *
NB  TH       1020 3327 0.31 0.52 1724 0.59     *
NB  RT        211 1238 0.17 0.55  682 0.31
SB  TH        980 3327 0.29 0.52 1724 0.57
SB  RT        141 1233 0.11 0.52  639 0.22

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.56 TOTAL V/C= 0.59
FOR THE WESTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  247 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.51 0.39 100.0 17.73  948   0.40 0.85   15.41  C   7.9    8
WB  LT       0.44 0.42 100.0 15.57  366   0.55 1.00   16.12  C   4.3    4
WB  TH-RT    0.59 0.42 100.0 16.93  788   0.88 0.85   15.13  C   7.5    7
NB  TH       0.59 0.52 100.0 12.72 1724   0.40 0.85   11.16  B  13.0   13
NB  RT       0.31 0.55 100.0  9.22  682   0.09 0.85    7.91  B   2.6    3
SB  TH       0.57 0.52 100.0 12.51 1724   0.34 0.85   10.92  B  12.5   12
SB  RT       0.22 0.52 100.0  9.97  639   0.03 0.85    8.50  B   1.9    2

DIR Delay LOS
EB  15.41  C
WB  15.38  C
NB  10.60  B
SB  10.61  B
INTERSECTION DELAY = 12.14 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  14.5 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  51.8 secs green,   3.0 secs yellow + red clear
suggested timing phase 2 is   2.8 secs green,   0.0 secs yellow + red clear
suggested timing phase 3 is  39.3 secs green,   3.0 secs yellow + red clear
```

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
PARKER/RUGGLES
NO BUILD CONDITIONS (W/IMPROVEMENTS) - AM PEAK HOUR
date:08-13-1989 time:22:58:24
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I8NBAM GEOMETRICS=P18INT8M SIGNAL=P18INT8M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	21	673	106	0	2	0	0.0	11.0	0.0	48
WB	57	701	104	0	2	0	0.0	11.0	0.0	48
NB	128	264	25	0	1	0	0.0	12.0	0.0	20
SB	132	241	40	0	1	0	0.0	11.0	0.0	20

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.930	100	N 16.0	3
WB	0.0%	2.0%	N	0	0	.930	100	N 16.0	3
NB	0.0%	2.0%	N	10	0	.930	100	N 9.0	3
SB	0.0%	2.0%	Y	0	0	.930	100	N 9.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*	*	*	*		*	*	*		48.1	3	A
2	*	*	*		*	*	*					*				*	45.9	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	21	673	106	.930	23	724	114
WB	57	701	104	.930	61	754	112
NB	128	264	25	.930	138	284	27
SB	132	241	40	.930	142	259	43

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	860	2	1.05	903	0.03	0.13
WB	LT-TH-RT	927	2	1.05	973	0.07	0.12
NB	LT-TH-RT	448	1	1.00	448	0.31	0.06
SB	LT-TH-RT	444	1	1.00	444	0.32	0.10

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	61	754	112	100	100	100	0	2	0	927
WESTBOUND	23	724	114	100	100	100	0	2	0	860
NORTHBOUND	142	259	43	100	100	100	0	1	0	302
SOUTHBOUND	138	284	27	100	100	100	0	1	0	311

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	0.974	0.822	2757
WB	LT-TH-RT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	0.976	0.757	2546
NB	LT-TH-RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.889	0.746	1183
SB	LT-TH-RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.882	0.732	1113

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	100	46	2	860	860	23	0.03	2	927	0.07
WB	100	46	2	927	927	61	0.07	2	860	0.03
NB	100	48	1	448	311	138	0.31	1	302	0.32
SB	100	48	1	444	302	142	0.32	1	311	0.31

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	3119	0.297	22.991	0.296	0.133	22.888	0.867	10.500	3.805	0.643	0.822
WB	3353	0.257	27.204	0.337	0.288	18.675	0.712	4.739	3.335	0.514	0.757
NB	1489	0.203	34.918	0.686	0.307	13.203	0.693	4.114	1.640	0.746	0.746
SB	1505	0.207	34.617	0.681	0.320	13.504	0.680	3.941	1.653	0.732	0.732

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH-RT	903	2757	0.33	0.46	1265	0.71	
WB	LT-TH-RT	973	2546	0.38	0.46	1168	0.83	*
NB	LT-TH-RT	448	1183	0.38	0.48	569	0.79	
SB	LT-TH-RT	444	1113	0.40	0.48	535	0.83	*

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.78 TOTAL V/C= 0.83

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH-RT	0.71	0.46	100.0	16.55	1265	1.36	0.85	15.22	C	12.9	13
WB	LT-TH-RT	0.83	0.46	100.0	18.02	1168	3.75	0.85	18.51	C	13.9	15
NB	LT-TH-RT	0.79	0.48	100.0	16.47	569	5.05	0.85	18.30	C	6.5	8
SB	LT-TH-RT	0.83	0.48	100.0	17.02	535	7.33	0.85	20.69	C	6.4	9

DIR	Delay	LOS
EB	15.22	C
WB	18.51	C
NB	18.30	C
SB	20.69	C

INTERSECTION DELAY = 17.75 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 33.8 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 48.0 secs green, 3.0 secs yellow + red clear
suggested timing phase 2 is 46.0 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
PARKER/RUGGLES
NO BUILD CONDITIONS (W/IMPROVEMENTS) - PM PEAK HOUR
date:08-13-1989 time:23:09:48
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I8NBPM GEOMETRICS=P18INT8M SIGNAL=P18INT8M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	32	853	115	0	2	0	0.0	11.0	0.0	48
WB	34	941	103	0	2	0	0.0	11.0	0.0	48
NB	99	182	33	0	1	0	0.0	12.0	0.0	20
SB	168	269	28	0	1	0	0.0	11.0	0.0	20

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.970	100	N	16.0	3
WB	0.0%	2.0%	N	0	0	.970	100	N	16.0	3
NB	0.0%	2.0%	N	10	0	.970	100	N	9.0	3
SB	0.0%	2.0%	Y	0	0	.970	100	N	9.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*	*	*	*		*	*	*		43.9	3	A
2	*	*	*		*	*	*					*				*	50.1	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	32	853	115	.970	33	879	119
WB	34	941	103	.970	35	970	106
NB	99	182	33	.970	102	188	34
SB	168	269	28	.970	173	277	29

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	1031	2	1.05	1082	0.03	0.12
WB	LT-TH-RT	1111	2	1.05	1167	0.03	0.10
NB	LT-TH-RT	324	1	1.00	324	0.32	0.11
SB	LT-TH-RT	479	1	1.00	479	0.36	0.06

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	35	970	106	100	100	100	0	2	0	1111
WESTBOUND	33	879	119	100	100	100	0	2	0	1031
NORTHBOUND	173	277	29	100	100	100	0	1	0	306
SOUTHBOUND	102	188	34	100	100	100	0	1	0	222

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	0.977	0.705	2374
WB	LT-TH-RT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	0.981	0.750	2535
NB	LT-TH-RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.881	0.714	1120
SB	LT-TH-RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.889	0.787	1205

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	100	50	2	1031	1031	33	0.03	2	1111	0.03
WB	100	50	2	1111	1111	35	0.03	2	1031	0.03
NB	100	44	1	324	222	102	0.32	1	306	0.36
SB	100	44	1	479	306	173	0.36	1	222	0.32

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	3208	0.346	23.590	0.180	0.215	26.472	0.785	7.007	6.236	0.410	0.705
WB	3083	0.334	24.980	0.231	0.185	25.083	0.815	8.116	4.877	0.500	0.750
NB	1512	0.203	29.699	0.684	0.315	14.238	0.685	4.050	1.646	0.714	0.714
SB	1496	0.148	34.183	0.736	0.361	9.754	0.639	3.139	1.528	0.787	0.787

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH-RT	1082	2374	0.46	0.50	1189	0.91	
WB	LT-TH-RT	1167	2535	0.46	0.50	1269	0.92	*
NB	LT-TH-RT	324	1120	0.29	0.44	492	0.66	
SB	LT-TH-RT	479	1205	0.40	0.44	529	0.91	*

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.86 TOTAL V/C= 0.91

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH-RT	0.91	0.50	100.0	17.42	1189	7.60	0.85	21.26	C	14.3	19
WB	LT-TH-RT	0.92	0.50	100.0	17.56	1269	7.89	0.85	21.63	C	15.4	21
NB	LT-TH-RT	0.66	0.44	100.0	16.80	492	2.24	0.85	16.18	C	5.0	5
SB	LT-TH-RT	0.91	0.44	100.0	19.83	529	13.60	0.85	28.42	D	7.5	12

DIR	Delay	LOS
EB	21.26	C
WB	21.63	C
NB	16.18	C
SB	28.42	D

INTERSECTION DELAY = 21.99 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 62.0 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 43.6 secs green, 3.0 secs yellow + red clear
suggested timing phase 2 is 50.4 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
PARKER/RUGGLES
NO BUILD CONDITIONS (W/IMPROVEMENTS) - SAT PEAK HOUR
date:08-13-1989 time:23:17:41
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I8NBSAT GEOMETRICS=P18INT8M SIGNAL=P18INT8M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	7	502	35	0	2	0	0.0	11.0	0.0	48
WB	25	536	107	0	2	0	0.0	11.0	0.0	48
NB	45	118	36	0	1	0	0.0	12.0	0.0	20
SB	141	224	14	0	1	0	0.0	11.0	0.0	20

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.880	50	N	16.0	3
WB	0.0%	2.0%	N	0	0	.880	50	N	16.0	3
NB	0.0%	2.0%	N	10	0	.880	50	N	9.0	3
SB	0.0%	2.0%	Y	0	0	.880	50	N	9.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*	*	*	*		*	*	*		52.4	3	A
2	*	*	*		*	*	*					*				*	41.6	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	7	502	35	.880	8	570	40
WB	25	536	107	.880	28	609	122
NB	45	118	36	.880	51	134	41
SB	141	224	14	.880	160	255	16

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	618	2	1.05	649	0.01	0.06
WB	LT-TH-RT	759	2	1.05	797	0.04	0.16
NB	LT-TH-RT	226	1	1.00	226	0.23	0.18
SB	LT-TH-RT	431	1	1.00	431	0.37	0.04

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	28	609	122	100	100	100	0	2	0	759
WESTBOUND	8	570	40	100	100	100	0	2	0	618
NORTHBOUND	160	255	16	100	100	100	0	1	0	270
SOUTHBOUND	51	134	41	100	100	100	0	1	0	175

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	0.989	0.959	3269
WB	LT-TH-RT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	0.972	0.926	3103
NB	LT-TH-RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.871	0.852	1323
SB	LT-TH-RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.894	0.856	1319

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	100	42	2	618	618	8	0.01	2	759	0.04
WB	100	42	2	759	759	28	0.04	2	618	0.01
NB	100	52	1	226	175	51	0.23	1	270	0.37
SB	100	52	1	431	270	160	0.37	1	175	0.23

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	3433	0.221	24.962	0.401	0.050	16.594	0.950	13.186	2.809	0.919	0.959
WB	3518	0.176	29.097	0.489	0.121	12.459	0.879	8.037	2.302	0.853	0.926
NB	1532	0.176	42.253	0.706	0.226	10.192	0.774	4.991	1.594	0.852	0.852
SB	1587	0.110	46.551	0.766	0.372	5.894	0.628	2.519	1.469	0.856	0.856

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH-RT	649	3269	0.20	0.42	1358	0.48	
WB	LT-TH-RT	797	3103	0.26	0.42	1289	0.62	*
NB	LT-TH-RT	226	1323	0.17	0.52	694	0.33	
SB	LT-TH-RT	431	1319	0.33	0.52	692	0.62	*

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.58 TOTAL V/C= 0.62

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH-RT	0.48	0.42	100.0	16.20	1358	0.21	0.85	13.95	B	10.0	10
WB	LT-TH-RT	0.62	0.42	100.0	17.47	1289	0.66	0.85	15.40	C	12.3	12
NB	LT-TH-RT	0.33	0.52	100.0	10.36	694	0.10	0.85	8.90	B	3.0	3
SB	LT-TH-RT	0.62	0.52	100.0	12.76	692	1.25	0.85	11.91	B	5.7	6

DIR	Delay	LOS
EB	13.95	B
WB	15.40	C
NB	8.90	B
SB	11.91	B

INTERSECTION DELAY = 13.54 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 15.6 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 52.6 secs green, 3.0 secs yellow + red clear
suggested timing phase 2 is 41.4 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
MELNEA CASS/WASHINGTON
NO BUILD CONDITIONS (W/IMPROVEMENTS) - AM PEAK HOUR
date:08-22-1989 time:15:01:52
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I12NBAML GEOMETRICS=P18I12 SIGNAL=P18I12
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	996	45	0	2	0	0.0	12.0	0.0	48
WB	57	988	29	0	2	0	0.0	12.0	0.0	48
NB	115	556	29	1	2	0	10.0	11.0	0.0	34
SB	15	188	25	1	2	0	10.0	11.0	0.0	34

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	8.0%	N	0	0	.880	100	N	16.0	3
WB	0.0%	8.0%	N	0	0	.880	100	N	16.0	3
NB	0.0%	12.0%	N	0	20	.880	100	N	12.5	3
SB	0.0%	12.0%	N	0	20	.880	100	N	12.5	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*									*				*	0.0	0	A
2	*	*	*		*	*	*					*				*	67.6	3	A
3				*				*					*	*	*		0.1	0	A
4				*				*	*	*	*		*	*	*		26.3	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	996	45	.880	0	1132	51
WB	57	988	29	.880	65	1123	33
NB	115	556	29	.880	131	632	33
SB	15	188	25	.880	17	214	28

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH-RT	1183	2	1.05	1242	0.00	0.04
WB	LT-TH-RT	1220	2	1.05	1281	0.05	0.03
NB	LT	131	1	1.00	131	1.00	0.00
NB	TH-RT	665	2	1.05	698	0.00	0.05
SB	LT	17	1	1.00	17	1.00	0.00
SB	TH-RT	242	2	1.05	254	0.00	0.12

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	1132	51	100	100	100	0	2	0	1183
NORTHBOUND	17	214	28	0	100	100	1	2	0	242
SOUTHBOUND	131	632	33	100	100	100	1	2	0	665

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH-RT	1800	2	1.000	0.962	1.000	1.000	1.000	1.000	0.991	1.000	3432
WB	LT-TH-RT	1800	2	1.000	0.962	1.000	1.000	1.000	1.000	0.995	0.650	2238
NB	LT	1800	1	0.933	0.943	1.000	1.000	1.000	1.000	1.000	0.666	1056
NB	TH-RT	1800	2	0.967	0.943	1.000	1.000	0.958	1.000	0.990	1.000	3115

```
SB  LT        1800  1 0.933 0.943 1.000 1.000 1.000 1.000 1.000 0.950 1506
SB  TH-RT     1800  2 0.967 0.943 1.000 1.000 0.958 1.000 0.977 1.000 3073

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB 100  68  2 1220 1220   65 0.05  2 1183 0.00
NB 100  26  1  131  665  131 1.00  2  242 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
WB 3600 0.329 51.747 0.136 0.365 15.856 0.635  3.391    8.293 0.300 0.650
NB 3600 0.067 21.045 0.724 1.000  5.298 0.000  0.000    1.554 0.666 0.666

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH-RT    1242 3432 0.36 0.68 2320 0.54
WB  LT-TH-RT 1281 2238 0.57 0.68 1513 0.85     *
NB  LT        131 1056 0.12 0.26  278 0.47
NB  TH-RT     698 3115 0.22 0.26  821 0.85     *
SB  LT         17 1506 0.00 0.00  127 0.13     *
SB  TH-RT     254 3073 0.08 0.26  811 0.31

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.80 TOTAL V/C= 0.85
FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 63 LEFT TURNS ON THE CHANGE INTERVAL AND  63 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH-RT    0.54 0.68 100.0   6.25 2320    0.20 0.85    5.48  B  10.6   11
WB  LT-TH-RT 0.85 0.68 100.0   9.33 1513    3.35 0.85   10.78  B  11.0   12
NB  LT       0.47 0.26 100.0  23.53  278    0.95 0.85   20.81  C   2.7    3
NB  TH-RT    0.85 0.26 100.0  26.57  821    5.98 0.85   27.67  D  13.6   16
SB  LT       0.13 0.26 100.0  21.34  127    0.03 1.00   21.37  C   0.5    1
SB  TH-RT    0.31 0.26 100.0  22.44  811    0.08 0.85   19.14  C   4.9    5

DIR Delay LOS
EB   5.48  B
WB  10.78  B
NB  26.59  D
SB  19.28  C
INTERSECTION DELAY = 13.21 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  37.2 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is   0.0 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  67.6 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is   0.0 secs green,   0.0 secs yellow + red clear
suggested timing phase 4 is  26.4 secs green,   3.0 secs yellow + red clear
```

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
MELNEA CASS/WASHINGTON
NO BUILD CONDITIONS (W/IMPROVEMENT) - PM PEAK HOUR
date:08-22-1989 time:15:11:56
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I12NBPML GEOMETRICS=P18I12 SIGNAL=P18I12
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	1485	84	0	2	0	0.0	12.0	0.0	48
WB	78	1003	23	0	2	0	0.0	12.0	0.0	48
NB	97	425	49	1	2	0	10.0	11.0	0.0	34
SB	45	381	127	1	2	0	10.0	11.0	0.0	34

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT MIN TIME	TYPE
EB	0.0%	3.0%	N	0	0	.970	100	N 16.0	3
WB	0.0%	3.0%	N	0	0	.970	100	N 16.0	3
NB	0.0%	8.0%	N	0	20	.970	100	N 12.5	3
SB	0.0%	8.0%	N	0	20	.970	100	N 12.5	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*									*				*	0.0	0	A
2	*	*	*		*	*	*					*				*	73.4	3	A
3				*				*					*	*	*		0.1	0	A
4				*				*	*	*	*		*	*	*		20.5	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	1485	84	.970	0	1531	87
WB	78	1003	23	.970	80	1034	24
NB	97	425	49	.970	100	438	51
SB	45	381	127	.970	46	393	131

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH-RT	1618	2	1.05	1698	0.00	0.05
WB	LT-TH-RT	1138	2	1.05	1195	0.07	0.02
NB	LT	100	1	1.00	100	1.00	0.00
NB	TH-RT	489	2	1.05	513	0.00	0.10
SB	LT	46	1	1.00	46	1.00	0.00
SB	TH-RT	524	2	1.05	550	0.00	0.25

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	1531	87	100	100	100	0	2	0	1399
NORTHBOUND	46	393	131	0	99	99	1	2	0	520
SOUTHBOUND	100	438	51	100	100	100	1	2	0	489

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH-RT	1800	2	1.000	0.985	1.000	1.000	1.000	1.000	0.989	1.000	3509
WB	LT-TH-RT	1800	2	1.000	0.985	1.000	1.000	1.000	1.000	0.996	0.527	1863
NB	LT	1800	1	0.933	0.962	1.000	1.000	1.000	1.000	1.000	0.364	588
NB	TH-RT	1800	2	0.967	0.962	1.000	1.000	0.958	1.000	0.980	1.000	3141

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SB  LT        1800  1 0.933 0.962 1.000 1.000 1.000 1.000 1.000 0.950 1535
SB  TH-RT     1800  2 0.967 0.962 1.000 1.000 0.958 1.000 0.951 1.000 3048

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB 100  73  2 1138 1138   80 0.07  2 1399 0.00
NB 100  20  1  100  489  100 1.00  2  520 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
WB 3600 0.389 56.437 0.001 1.000 16.929 0.000  0.000 1800.000 0.055 0.527
NB 3600 0.144  7.063 0.550 1.000 13.423 0.000  0.000    2.045 0.364 0.364

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH-RT    1698 3509 0.48 0.73 2575 0.66
WB  LT-TH-RT 1195 1863 0.64 0.73 1367 0.87     *
NB  LT        100  588 0.17 0.20  120 0.83
NB  TH-RT     513 3141 0.16 0.20  644 0.80
SB  LT         46 1535 0.00 0.00  132 0.35
SB  TH-RT     550 3048 0.18 0.21  629 0.87     *

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.82 TOTAL V/C= 0.87
FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 65 LEFT TURNS ON THE CHANGE INTERVAL AND  65 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH-RT    0.66 0.73 100.0   5.22 2575    0.45 0.85    4.82  A  12.0   12
WB  LT-TH-RT 0.87 0.73 100.0   7.52 1367    4.71 0.85   10.40  B   8.4   11
NB  LT       0.83 0.20 100.0  28.95  120   24.29 0.85   45.25  E   2.4    5
NB  TH-RT    0.80 0.20 100.0  28.72  644    4.85 0.85   28.53  D  10.8   13
SB  LT       0.35 0.21 100.0  25.80  132    0.68 1.00   26.48  D   1.3    2
SB  TH-RT    0.87 0.21 100.0  29.20  629    9.17 0.85   32.62  D  11.5   15

DIR Delay LOS
EB   4.82  A
WB  10.40  B
NB  31.26  D
SB  32.14  D
INTERSECTION DELAY = 14.37 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  44.5 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is   0.0 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  73.4 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is   0.1 secs green,   0.0 secs yellow + red clear
suggested timing phase 4 is  20.6 secs green,   3.0 secs yellow + red clear
```

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
MELNEA CASS/WASHINGTON
NO BUILD CONDITIONS (W/IMPROVEMENTS) - SAT PEAK HOUR
date:08-22-1989 time:15:39:40
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I12NBS GEOMETRICS=P18I12 SIGNAL=P18I12
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	1114	63	0	2	0	0.0	12.0	0.0	48
WB	59	753	17	0	2	0	0.0	12.0	0.0	48
NB	97	425	49	1	2	0	10.0	11.0	0.0	34
SB	41	342	114	1	2	0	10.0	11.0	0.0	34

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	50	N	16.0	3
WB	0.0%	2.0%	N	0	0	.950	50	N	16.0	3
NB	0.0%	5.0%	N	0	15	.950	50	N	12.5	3
SB	0.0%	5.0%	N	0	15	.950	50	N	12.5	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*									*				*	0.0	0	A
2	*	*	*		*	*	*					*				*	68.5	3	A
3				*				*					*	*	*		0.1	0	A
4				*				*	*	*	*		*	*	*		25.4	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	1114	63	.950	0	1173	66
WB	59	753	17	.950	62	793	18
NB	97	425	49	.950	102	447	52
SB	41	342	114	.950	43	360	120

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH-RT	1239	2	1.05	1301	0.00	0.05
WB	LT-TH-RT	873	2	1.05	916	0.07	0.02
NB	LT	102	1	1.00	102	1.00	0.00
NB	TH-RT	499	2	1.05	524	0.00	0.10
SB	LT	43	1	1.00	43	1.00	0.00
SB	TH-RT	480	2	1.05	504	0.00	0.25

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN BEING OPPOSED	OPPOSING APPROACH VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	1173	66	100	100	100	0	2	0	1239
NORTHBOUND	43	360	120	0	99	99	1	2	0	478
SOUTHBOUND	102	447	52	100	100	100	1	2	0	499

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.991	1.000	3531
WB	LT-TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.996	0.589	2094
NB	LT	1800	1	0.933	0.976	1.000	1.000	1.000	1.000	1.000	0.440	721
NB	TH-RT	1800	2	0.967	0.976	1.000	1.000	0.969	1.000	0.982	1.000	3230

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SB  LT        1800  1 0.933 0.976 1.000 1.000 1.000 1.000 1.000 0.950 1557
SB  TH-RT     1800  2 0.967 0.976 1.000 1.000 0.969 1.000 0.957 1.000 3146

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB 100  68  2  873  873   62 0.07  2 1239 0.00
NB 100  25  1  102  499  102 1.00  2  478 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
WB 3600 0.344 51.952 0.101 0.572 16.536 0.428  1.494   11.176 0.179 0.589
NB 3600 0.133 13.969 0.577 1.000 11.411 0.000  0.000    1.951 0.440 0.440

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH-RT    1301 3531 0.37 0.68 2418 0.54
WB  LT-TH-RT  916 2094 0.44 0.68 1434 0.64     *
NB  LT        102  721 0.14 0.25  183 0.56
NB  TH-RT     524 3230 0.16 0.25  820 0.64     *
SB  LT         43 1557 0.00 0.00  177 0.24     *
SB  TH-RT     504 3146 0.16 0.26  803 0.63

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.60 TOTAL V/C= 0.64
FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 66 LEFT TURNS ON THE CHANGE INTERVAL AND  110 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH-RT    0.54 0.68 100.0   5.97 2418    0.19 0.85    5.24  B  10.8    11
WB  LT-TH-RT 0.64 0.68 100.0   6.71 1434    0.69 0.85    6.29  B   7.6     8
NB  LT       0.56 0.25 100.0  24.65  183    2.81 0.85   23.35  C   2.1     3
NB  TH-RT    0.64 0.25 100.0  25.26  820    1.19 0.85   22.48  C  10.3    10
SB  LT       0.24 0.26 100.0  22.48  177    0.15 1.00   22.63  C   1.2     1
SB  TH-RT    0.63 0.26 100.0  25.11  803    1.12 0.85   22.29  C   9.9    10

DIR Delay LOS
EB   5.24  B
WB   6.29  B
NB  22.62  C
SB  22.32  C
INTERSECTION DELAY = 11.49 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  16.3 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is   0.0 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  68.5 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is   0.1 secs green,   0.0 secs yellow + red clear
suggested timing phase 4 is  25.4 secs green,   3.0 secs yellow + red clear
```

Level of Service Calculations:

Master Plan Design (1996) Conditions
(AM, PM and SAT peak hours)

- Tremont/Ruggles/Whittier

- Tremont/Melnea Cass
  Access Option 1 (Without Tremont Access)
  Access Option 2 (With Tremont Right In/Out)
  Access Option 3 (With Tremont Access)

- Tremont/Ruggles Center Drive
  (With Tremont Right In/Out)
  (With Tremont Access)

- Ruggles/Busway

- Tremont/Prentiss

- Huntington/Ruggles

- Tremont/Columbus/New Dudley

- Parker/Ruggles

- Melnea Cass/Columbus/Busway

- Melnea Cass/Washington

- Melnea Cass/Massachusetts/Southampton
  Expressway Ramps

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/RUGGLES/WHITTIER
MASTER PLAN DESIGN - AM PEAK HOUR
date:08-15-1989 time:09:45:19
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I1MPAM GEOMETRICS=P18I1M SIGNAL=P18I1M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	763	0	307	2	0	1	11.0	0.0	15.0	50
WB	40	36	24	0	1	0	0.0	10.0	0.0	24
NB	478	1576	0	1	3	0	11.0	11.0	0.0	42
SB	0	914	914	0	2	1	0.0	11.0	15.0	42

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	-2.0%	2.0%	N	0	0	.960	200	N	16.5	4
WB	0.0%	2.0%	Y	2	0	.960	100	N	16.5	3
NB	0.0%	2.0%	N	0	0	.960	100	N	14.5	3
SB	0.0%	2.0%	N	0	0	.960	200	N	14.5	4

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*						*	23.5	0	A
2				*				*	*	*				*	*		34.9	3	A
3	*		*					*				*			*		25.2	0	A
4	*		*		*	*	*					*				*	10.4	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	763	0	307	.960	795	0	320
WB	40	36	24	.960	42	38	25
NB	478	1576	0	.960	498	1642	0
SB	0	914	914	.960	0	952	952

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	795	2	1.05	835	1.00	0.00
EB	RT	320	1	1.00	320	0.00	1.00
WB	LT-TH-RT	104	1	1.00	104	0.40	0.24
NB	LT	498	1	1.00	498	1.00	0.00
NB	TH	1642	3	1.10	1806	0.00	0.00
SB	TH	952	2	1.05	1000	0.00	0.00
SB	RT	952	1	1.00	952	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	42	38	25	100	100	100	0	1	0	63
WESTBOUND	795	0	320	0	0	0	2	0	1	0
NORTHBOUND	0	952	952	100	100	0	0	2	1	952

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	2	0.967	0.990	1.010	1.000	1.000	1.000	1.000	0.920	3202
EB	RT	1800	1	1.100	0.990	1.010	1.000	1.000	1.000	0.821	1.000	1626
WB	LT-TH-RT	1800	1	0.933	0.990	1.000	0.890	1.000	1.000	0.845	0.827	1034

NB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.950	1637
NB	TH	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	1.000	5168
SB	TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	3446
SB	RT	1800	1	1.100	0.990	1.000	1.000	1.000	0.795	1.000	1558

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT	835	3202	0.21	0.25	956	0.83	
EB	RT	320	1626	0.20	0.59	961	0.33	
WB	LT-TH-RT	104	1034	0.10	0.10	107	0.97	*
NB	LT	498	1637	0.23	0.24	503	0.99	*
NB	TH	1806	5168	0.35	0.58	3020	0.60	
SB	TH	1000	3446	0.29	0.35	1203	0.83	
SB	RT	952	1558	0.61	0.60	936	1.02	*

CYCLE=100.0 LOST= 3.0 SUM V/S CRIT= 0.94 TOTAL V/C= 0.97
FOR THE EASTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
70 LEFT TURNS ON THE CHANGE INTERVAL AND 81 ON THE PERMISSIVE PHASE
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/
RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
69 LEFT TURNS ON THE CHANGE INTERVAL AND 49 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.83	0.36	100.0	22.40	956	4.43	1.00	26.83	D	16.5	19
EB	RT	0.33	0.59	100.0	7.92	961	0.08	0.62	4.96	A	3.6	4
WB	LT-TH-RT	0.97	0.10	100.0	33.93	107	56.92	0.85	77.22	F	3.5	8
NB	LT	0.99	0.58	100.0	15.55	503	28.22	1.00	43.78	E	11.3	19
NB	TH	0.60	0.58	100.0	10.09	3020	0.24	0.85	8.78	B	19.0	19
SB	TH	0.83	0.35	100.0	22.68	1203	3.59	0.72	18.99	C	17.2	17
SB	RT	1.02	0.60	100.0	15.58	936	26.94	0.78	33.36	D	14.1	27

DIR	Delay	LOS
EB	20.77	C
WB	77.22	F
NB	16.34	C
SB	26.00	D

INTERSECTION DELAY = 21.84 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 536.7 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 23.9 secs green, 0.0 secs yellow + red clear
suggested timing phase 2 is 34.7 secs green, 3.0 secs yellow + red clear
suggested timing phase 3 is 25.0 secs green, 0.0 secs yellow + red clear
suggested timing phase 4 is 10.3 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/RUGGLES/WHITTIER
MASTER PLAN DESIGN - PM PEAK HOUR
date:08-15-1989 time:09:50:39
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I1MPPM GEOMETRICS=P18I1M SIGNAL=P18I1M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	932	0	345	2	0	1	11.0	0.0	15.0	50
WB	40	20	26	0	1	0	0.0	10.0	0.0	24
NB	370	1211	0	1	3	0	11.0	11.0	0.0	42
SB	0	1444	1108	0	2	1	0.0	11.0	15.0	42

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	-2.0%	2.0%	N	0	0	.940	200	N	16.5	4
WB	0.0%	2.0%	Y	0	0	.940	100	N	16.5	3
NB	0.0%	2.0%	N	0	0	.940	100	N	14.5	3
SB	0.0%	2.0%	N	0	0	.940	200	N	14.5	4

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*						*	18.1	0	A
2				*				*	*	*				*	*		43.6	3	A
3	*		*					*				*			*		24.7	0	A
4	*		*		*	*	*					*				*	7.6	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	932	0	345	.940	991	0	367
WB	40	20	26	.940	43	21	28
NB	370	1211	0	.940	394	1288	0
SB	0	1444	1108	.940	0	1536	1179

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	991	2	1.05	1041	1.00	0.00
EB	RT	367	1	1.00	367	0.00	1.00
WB	LT-TH-RT	91	1	1.00	91	0.47	0.30
NB	LT	394	1	1.00	394	1.00	0.00
NB	TH	1288	3	1.10	1417	0.00	0.00
SB	TH	1536	2	1.05	1613	0.00	0.00
SB	RT	1179	1	1.00	1179	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	43	21	28	100	100	100	0	1	0	49
WESTBOUND	991	0	367	0	0	0	2	0	1	0
NORTHBOUND	0	1536	1179	100	100	0	0	2	1	1399

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	2	0.967	0.990	1.010	1.000	1.000	1.000	1.000	0.920	3202
EB	RT	1800	1	1.100	0.990	1.010	1.000	1.000	1.000	0.819	1.000	1623
WB	LT-TH-RT	1800	1	0.933	0.990	1.000	1.000	1.000	1.000	0.830	0.815	1126

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NB  LT        1800  1 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.950 1637
NB  TH        1800  3 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 5168
SB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3446
SB  RT        1800  1 1.100 0.990 1.000 1.000 1.000 1.000 0.789 1.000 1547

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT       1041 3202 0.27 0.25  914 1.09
EB  RT        367 1623 0.23 0.50  818 0.45
WB  LT-TH-RT   91 1126 0.08 0.08   85 1.07     *
NB  LT        394 1637 0.20 0.18  366 1.08     *
NB  TH       1417 5168 0.27 0.62 3190 0.44
SB  TH       1613 3446 0.47 0.44 1502 1.07
SB  RT       1179 1547 0.76 0.68 1057 1.12     *

CYCLE=100.0  LOST= 3.0  SUM V/S CRIT= 1.04 TOTAL V/C= 1.07
FOR THE EASTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 70 LEFT TURNS ON THE CHANGE INTERVAL AND  53 ON THE PERMISSIVE PHASE
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  0 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2    PF   Delay LOS Avg Q  95% Q
EB  LT       1.09 0.32 100.0  26.82  914   50.39 1.00   77.21  F  31.6   65
EB  RT       0.45 0.50 100.0  12.08  818    0.28 0.62    7.66  B   5.1    5
WB  LT-TH-RT 1.07 0.08 100.0  35.33   85  104.67 0.85  118.99  F   4.2   10
NB  LT       1.08 0.62 100.0  16.61  366   61.64 1.00   78.24  F  13.0   27
NB  TH       0.44 0.62 100.0   7.67 3190    0.07 0.85    6.58  B  13.7   14
SB  TH       1.07 0.44 100.0  22.73 1502   40.60 0.80   50.70  E  33.7   66
SB  RT       1.12 0.68 100.0  16.03 1057   62.26 0.81   63.57  F  26.0   63

DIR Delay LOS
EB  59.08  E
WB 118.99  F
NB  22.16  C
SB  56.13  E
INTERSECTION DELAY = 47.67 INTERSECTION LOS=E

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
for chosen cycle length 100.0
suggested timing phase 1 is  18.2 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  43.4 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  24.8 secs green,   0.0 secs yellow + red clear
suggested timing phase 4 is   7.6 secs green,   3.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/RUGGLES/WHITTIER
MASTER PLAN DESIGN - SAT PEAK HOUR
date:08-15-1989 time:09:56:45
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I1MPS GEOMETRICS=P18I1M SIGNAL=P18I1M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	672	0	288	2	0	1	11.0	0.0	15.0	50
WB	16	14	17	0	1	0	0.0	10.0	0.0	24
NB	290	1103	0	1	3	0	11.0	11.0	0.0	42
SB	0	1213	417	0	2	1	0.0	11.0	15.0	42

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	-2.0%	2.0%	N	0	0	.920	100	N	16.5	4
WB	0.0%	2.0%	Y	2	0	.920	100	N	16.5	3
NB	0.0%	2.0%	N	0	0	.920	100	N	14.5	3
SB	0.0%	2.0%	N	0	0	.920	100	N	14.5	4

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*						*	17.7	0	A
2				*				*	*	*				*	*		47.3	3	A
3	*		*					*				*			*		23.2	0	A
4	*		*		*	*	*					*				*	5.8	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	672	0	288	.920	730	0	313
WB	16	14	17	.920	17	15	18
NB	290	1103	0	.920	315	1199	0
SB	0	1213	417	.920	0	1318	453

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	730	2	1.05	767	1.00	0.00
EB	RT	313	1	1.00	313	0.00	1.00
WB	LT-TH-RT	51	1	1.00	51	0.34	0.36
NB	LT	315	1	1.00	315	1.00	0.00
NB	TH	1199	3	1.10	1319	0.00	0.00
SB	TH	1318	2	1.05	1384	0.00	0.00
SB	RT	453	1	1.00	453	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	17	15	18	100	100	100	0	1	0	34
WESTBOUND	730	0	313	0	0	0	2	0	1	0
NORTHBOUND	0	1318	453	100	100	0	0	2	1	1318

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	2	0.967	0.990	1.010	1.000	1.000	1.000	1.000	0.920	3202
EB	RT	1800	1	1.100	0.990	1.010	1.000	1.000	1.000	0.820	1.000	1624
WB	LT-TH-RT	1800	1	0.933	0.990	1.000	0.890	1.000	1.000	0.834	0.838	1034

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NB  LT        1800  1 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.950 1637
NB  TH        1800  3 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 5168
SB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3446
SB  RT        1800  1 1.100 0.990 1.000 1.000 1.000 1.000 0.818 1.000 1604

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT        767 3202 0.20 0.23  859 0.85     *
EB  RT        313 1624 0.19 0.47  758 0.41
WB  LT-TH-RT   51 1034 0.05 0.06   60 0.85     *
NB  LT        315 1637 0.15 0.18  371 0.85     *
NB  TH       1319 5168 0.26 0.65 3361 0.39
SB  TH       1384 3446 0.40 0.47 1631 0.85     *
SB  RT        453 1604 0.28 0.70 1131 0.40

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.80 TOTAL V/C= 0.85
FOR THE EASTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 70 LEFT TURNS ON THE CHANGE INTERVAL AND  48 ON THE PERMISSIVE PHASE
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  13 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C      d1     c      d2    PF   Delay LOS Avg Q  95% Q
EB  LT        0.85 0.29 100.0  25.44  859    5.76 1.00   31.19  D  15.6   20
EB  RT        0.41 0.47 100.0  13.39  758    0.22 0.62    8.44  B   4.6    5
WB  LT-TH-RT  0.85 0.06 100.0  35.46   60   43.26 0.85   66.91  F   1.6    4
NB  LT        0.85 0.65 100.0  10.37  371   11.52 1.00   21.89  C   7.2    7
NB  TH        0.39 0.65 100.0   6.24 3361    0.04 0.85    5.34  B  11.6   12
SB  TH        0.85 0.47 100.0  17.61 1631    3.16 0.73   15.15  C  19.3   19
SB  RT        0.40 0.70 100.0   4.61 1131    0.13 0.62    2.94  A   3.7    4

DIR Delay LOS
EB  24.60  C
WB  66.91  F
NB   8.53  B
SB  12.14  B
INTERSECTION DELAY = 14.39 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  37.5 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  17.7 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  47.3 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  23.2 secs green,   0.0 secs yellow + red clear
suggested timing phase 4 is   5.8 secs green,   3.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
MASTER PLAN DESIGN (W/O TREMONT ACCESS - EB DBL TH) - AM PEAK HOUR
date:08-22-1989 time:12:23:23
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2MPNAM GEOMETRICS=P18I2MT SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	9	114	282	0	2	1	0.0	11.0	11.0	44
WB	0	1653	68	0	3	0	0.0	11.0	0.0	49
NB	725	923	0	1	2	0	11.0	11.0	0.0	56
SB	62	498	21	0	3	0	0.0	11.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	100	N	16.3	4
WB	0.0%	2.0%	N	0	0	.950	50	N	16.3	3
NB	0.0%	2.0%	N	0	0	.950	100	N	15.0	4
SB	0.0%	2.0%	N	0	0	.950	100	N	15.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							38.6	0	A
2				*				*	*	*				*	*	*	12.9	3	A
3						*	*					*				*	35.8	3	A
4	*	*	*									*				*	3.7	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	9	114	282	.950	9	120	297
WB	0	1653	68	.950	0	1740	72
NB	725	923	0	.950	763	972	0
SB	62	498	21	.950	65	524	22

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	129	2	1.05	136	0.07	0.00
EB	RT	297	1	1.00	297	0.00	1.00
WB	TH-RT	1812	3	1.10	1993	0.00	0.04
NB	LT	763	1	1.00	763	1.00	0.00
NB	TH	972	2	1.05	1020	0.00	0.00
SB	LT-TH-RT	612	3	1.10	673	0.11	0.04

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	1740	72	0	0	0	0	3	0	0
NORTHBOUND	65	524	22	100	100	100	0	3	0	612
SOUTHBOUND	763	972	0	0	25	0	1	2	0	244

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.986	3396
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.846	1.000	1457
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.992	1.000	5128
NB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1637

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NB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3446
SB  LT-TH-RT  1800  3 0.967 0.990 1.000 1.000 1.000 1.000 0.993 0.939 4819

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
SB 100  13  3  612  612   65 0.11  2  244 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf      El    Fm   Flt
SB 3600 0.068  6.616 0.722 0.404  6.329 0.596  2.374   1.557 0.817 0.939

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH     136 3396 0.04 0.04  125 1.09     *
EB  RT        297 1457 0.20 0.42  616 0.48
WB  TH-RT    1993 5128 0.39 0.36 1834 1.09     *
NB  LT        763 1637 0.42 0.39  701 1.09     *
NB  TH       1020 3446 0.30 0.52 1776 0.57
SB  LT-TH-RT  673 4819 0.14 0.13  624 1.08     *

CYCLE=100.0  LOST= 9.0  SUM V/S CRIT= 0.99 TOTAL V/C= 1.09
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  0 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c     d2    PF  Delay LOS Avg Q  95% Q
EB  LT-TH    1.09 0.04 100.0 36.72  125  95.79 0.80 106.56  F   5.6    12
EB  RT       0.48 0.42 100.0 15.89  616   0.48 0.62  10.15  B   4.8     5
WB  TH-RT    1.09 0.36 100.0 25.64 1834  44.25 0.85  59.41  E  46.1    91
NB  LT       1.09 0.52 100.0 20.34  701  55.48 1.00  75.82  F  22.6    49
NB  TH       0.57 0.52 100.0 12.67 1776   0.34 0.62   8.07  B  13.1    13
SB  LT-TH-RT 1.08 0.13 100.0 33.47  624  52.73 0.85  73.27  F  19.8    38

DIR Delay LOS
EB  40.44  E
WB  59.41  E
NB  37.06  D
SB  73.27  F
INTERSECTION DELAY = 51.47 INTERSECTION LOS=E

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
for chosen cycle length 100.0
suggested timing phase 1 is  38.7 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  12.8 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  35.8 secs green,   3.0 secs yellow + red clear
suggested timing phase 4 is   3.7 secs green,   3.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
MASTER PLAN DESIGN (W/O TREMONT ACCESS - EB DBL TH) - PM PEAK HOUR
date:08-22-1989 time:12:33:58
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2MPNPM GEOMETRICS=P18I2MT SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	20	446	701	0	2	1	0.0	11.0	11.0	44
WB	0	1651	51	0	3	0	0.0	11.0	0.0	49
NB	447	686	0	1	2	0	11.0	11.0	0.0	56
SB	81	611	26	0	3	0	0.0	11.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.930	100	N	16.3	4
WB	0.0%	2.0%	N	0	0	.930	50	N	16.3	3
NB	0.0%	2.0%	N	0	0	.930	100	N	15.0	4
SB	0.0%	2.0%	N	0	0	.930	100	N	15.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							26.1	0	A
2				*				*	*	*			*	*	*		15.4	3	A
3						*	*					*				*	33.6	3	A
4	*	*	*									*				*	15.9	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	20	446	701	.930	22	480	754
WB	0	1651	51	.930	0	1775	55
NB	447	686	0	.930	481	738	0
SB	81	611	26	.930	87	657	28

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	501	2	1.05	526	0.04	0.00
EB	RT	754	1	1.00	754	0.00	1.00
WB	TH-RT	1830	3	1.10	2013	0.00	0.03
NB	LT	481	1	1.00	481	1.00	0.00
NB	TH	738	2	1.05	775	0.00	0.00
SB	LT-TH-RT	772	3	1.10	849	0.11	0.04

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	1775	55	0	0	0	0	3	0	0
NORTHBOUND	87	657	28	100	100	100	0	3	0	772
SOUTHBOUND	481	738	0	0	37	0	1	2	0	273

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.992	3416
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.832	1.000	1433
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.994	1.000	5138
NB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1637

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NB  TH         1800   2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3446
SB  LT-TH-RT   1800   3 0.967 0.990 1.000 1.000 1.000 1.000 0.993 0.921 4724

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
SB 100  15  3  772  772   87 0.11  2  273 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf      El    Fm   Flt
SB 3600 0.076  8.430 0.704 0.445  6.955 0.555  2.169   1.598 0.762 0.921

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH      526 3416 0.15 0.16  544 0.97
EB  RT         754 1433 0.53 0.42  603 1.25      *
WB  TH-RT     2013 5138 0.39 0.34 1725 1.17      *
NB  LT         481 1637 0.25 0.26  496 0.97
NB  TH         775 3446 0.22 0.42 1430 0.54
SB  LT-TH-RT   849 4724 0.18 0.15  727 1.17      *

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 1.10 TOTAL V/C= 1.17
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  0 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1     c     d2    PF   Delay LOS Avg Q  95% Q
EB  LT-TH    0.97 0.16 100.0 31.75   544  22.50 0.77   41.74  E  11.7    18
EB  RT       1.25 0.42 100.0 26.92   603 151.87 0.84  151.06  F  37.7    96
WB  TH-RT    1.17 0.34 100.0 27.57  1725  85.80 0.85   96.36  F  65.9   148
NB  LT       0.97 0.42 100.0 21.74   496  23.97 1.00   45.71  E  11.0    19
NB  TH       0.54 0.42 100.0 16.77  1430   0.33 0.62   10.60  B  12.0    12
SB  LT-TH-RT 1.17 0.15 100.0 33.17   727  94.75 0.85  108.73  F  32.4    71

DIR Delay LOS
EB 106.12  F
WB  96.36  F
NB  24.05  C
SB 108.73  F
INTERSECTION DELAY = 83.80 INTERSECTION LOS=F

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
for chosen cycle length 100.0
suggested timing phase 1 is  26.1 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  15.4 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  33.6 secs green,   3.0 secs yellow + red clear
suggested timing phase 4 is  15.9 secs green,   3.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
MASTER PLAN DESIGN (W/O TREMONT ACCESS - EB DBL TH) - SAT PEAK HOUR
date:08-22-1989 time:12:40:47
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2MPNS GEOMETRICS=P18I2MT SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	13	134	391	0	2	1	0.0	11.0	11.0	44
WB	0	984	118	0	3	0	0.0	11.0	0.0	49
NB	330	880	0	1	2	0	11.0	11.0	0.0	56
SB	92	576	35	0	3	0	0.0	11.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	25	N	16.3	4
WB	0.0%	2.0%	N	0	0	.950	25	N	16.3	3
NB	0.0%	2.0%	N	0	0	.950	25	N	15.0	4
SB	0.0%	2.0%	N	0	0	.950	25	N	15.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							26.3	0	A
2				*				*	*	*			*	*	*		24.4	3	A
3						*	*					*				*	32.8	3	A
4	*	*	*									*				*	7.5	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	13	134	391	.950	14	141	412
WB	0	984	118	.950	0	1036	124
NB	330	880	0	.950	347	926	0
SB	92	576	35	.950	97	606	37

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	155	2	1.05	162	0.09	0.00
EB	RT	412	1	1.00	412	0.00	1.00
WB	TH-RT	1160	3	1.10	1276	0.00	0.11
NB	LT	347	1	1.00	347	1.00	0.00
NB	TH	926	2	1.05	973	0.00	0.00
SB	LT-TH-RT	740	3	1.10	814	0.13	0.05

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	1036	124	0	0	0	0	3	0	0
NORTHBOUND	97	606	37	100	100	100	0	3	0	740
SOUTHBOUND	347	926	0	0	48	0	1	2	0	446

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.986	3396
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.847	1.000	1460
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.983	1.000	5079
NB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1637

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NB  TH         1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3446
SB  LT-TH-RT   1800  3 0.967 0.990 1.000 1.000 1.000 1.000 0.995 0.940 4834

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
SB 100  13  3  612  612   65 0.11  2  242 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
SB 3600 0.067  6.550 0.724 0.403  6.277 0.597  2.376    1.554 0.821 0.940

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH     136 3396 0.04 0.04  125 1.09     *
EB  RT        204 1457 0.14 0.42  618 0.33
WB  TH-RT    1993 5128 0.39 0.36 1835 1.09     *
NB  LT        763 1637 0.42 0.39  702 1.09     *
NB  TH       1020 3446 0.30 0.52 1776 0.57
SB  LT-TH-RT  673 4834 0.14 0.13  620 1.08     *

CYCLE=100.0  LOST= 9.0  SUM V/S CRIT= 0.99 TOTAL V/C= 1.09
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  0 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c     d2    PF   Delay LOS Avg Q  95% Q
EB  LT-TH    1.09 0.04 100.0 36.72  125  95.65 0.80  106.43  F   5.6    12
EB  RT       0.33 0.42 100.0 14.66  618   0.12 0.62    9.17  B   3.3     3
WB  TH-RT    1.09 0.36 100.0 25.64 1835  44.12 0.80   56.09  E  44.4    86
NB  LT       1.09 0.52 100.0 20.28  702  54.30 1.00   74.58  F  22.3    48
NB  TH       0.57 0.52 100.0 12.68 1776   0.34 0.62    8.07  B  13.1    13
SB  LT-TH-RT 1.08 0:13 100.0 33.54  620  55.49 0.80   71.56  F  19.6    37

DIR Delay LOS
EB  48.04  E
WB  56.09  E
NB  36.54  D
SB  71.56  F
INTERSECTION DELAY = 50.41 INTERSECTION LOS=E

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
for chosen cycle length 100.0
suggested timing phase 1 is  38.7 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  12.8 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  35.8 secs green,   3.0 secs yellow + red clear
suggested timing phase 4 is   3.7 secs green,   3.0 secs yellow + red clear
```

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
MASTER PLAN DESIGN (W/TREMONT RGT IN/OUT - EB DBL TH) - PM PEAK HOUR
date:08-22-1989 time:12:57:12
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2MPRPM GEOMETRICS=P18I2MT SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	20	446	423	0	2	1	0.0	11.0	11.0	44
WB	0	1650	51	0	3	0	0.0	11.0	0.0	49
NB	447	686	0	1	2	0	11.0	11.0	0.0	56
SB	81	613	24	0	3	0	0.0	11.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.930	100	N	16.3	4
WB	0.0%	2.0%	N	0	0	.930	50	N	16.3	4
NB	0.0%	2.0%	N	0	0	.930	100	N	15.0	4
SB	0.0%	2.0%	N	0	0	.930	100	N	15.0	4

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							23.2	0	A
2				*				*	*	*			*	*	*		17.0	3	A
3						*	*					*				*	36.5	3	A
4	*	*	*									*				*	14.3	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	20	446	423	.930	22	480	455
WB	0	1650	51	.930	0	1774	55
NB	447	686	0	.930	481	738	0
SB	81	613	24	.930	87	659	26

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	501	2	1.05	526	0.04	0.00
EB	RT	455	1	1.00	455	0.00	1.00
WB	TH-RT	1829	3	1.10	2012	0.00	0.03
NB	LT	481	1	1.00	481	1.00	0.00
NB	TH	738	2	1.05	775	0.00	0.00
SB	LT-TH-RT	772	3	1.10	849	0.11	0.03

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	1774	55	0	0	0	0	3	0	0
NORTHBOUND	87	659	26	100	100	100	0	3	0	772
SOUTHBOUND	481	738	0	0	42	0	1	2	0	312

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.992	3416
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.832	1.000	1433
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.994	1.000	5138
NB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1637

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NB  TH         1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3446
SB  LT-TH-RT   1800  3 0.967 0.990 1.000 1.000 1.000 1.000 0.993 0.902 4630

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
SB 100  17  3  772  772   87 0.11  2  312 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf      El    Fm   Flt
SB 3600 0.087  9.116 0.680 0.471  7.864 0.529  2.064   1.654 0.705 0.902

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH      526 3416 0.15 0.14  490 1.07     *
EB  RT         455 1433 0.32 0.38  538 0.84
WB  TH-RT     2012 5138 0.39 0.36 1873 1.07     *
NB  LT         481 1637 0.25 0.23  449 1.07     *
NB  TH         775 3446 0.22 0.40 1385 0.56
SB  LT-TH-RT   849 4630 0.18 0.17  786 1.08     *

CYCLE=100.0  LOST= 9.0  SUM V/S CRIT= 0.98 TOTAL V/C= 1.07
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  0 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1     c      d2    PF   Delay LOS Avg Q  95% Q
EB  LT-TH    1.07 0.14 100.0  32.96  490   55.04 0.80   70.47  F  15.8    30
EB  RT       0.84 0.38 100.0  21.70  538    8.23 0.73   21.78  C   7.9     9
WB  TH-RT    1.07 0.36 100.0  25.22 1873   39.00 0.80   51.43  E  42.3    79
NB  LT       1.07 0.40 100.0  23.85  449   55.07 1.00   78.91  F  15.7    33
NB  TH       0.56 0.40 100.0  17.52 1385    0.39 0.62   11.11  B  12.3    12
SB  LT-TH-RT 1.08 0.17 100.0  32.07  786   50.24 0.80   66.06  F  23.1    43

DIR Delay LOS
EB  47.90  E
WB  51.43  E
NB  37.07  D
SB  66.06  F
INTERSECTION DELAY = 49.65 INTERSECTION LOS=E

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
for chosen cycle length 100.0
suggested timing phase 1 is  23.1 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  17.1 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  36.5 secs green,   3.0 secs yellow + red clear
suggested timing phase 4 is  14.3 secs green,   3.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
MASTER PLAN DESIGN (W/TRMONT RGT IN/OUT - EB DBL TH) - SAT PEAK HOUR
date:08-22-1989 time:13:05:26
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2MPRS GEOMETRICS=P18I2MT SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	13	134	269	0	2	1	0.0	11.0	11.0	44
WB	0	984	118	0	3	0	0.0	11.0	0.0	49
NB	330	880	0	1	2	0	11.0	11.0	0.0	56
SB	92	578	33	0	3	0	0.0	11.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	100	N	16.3	4
WB	0.0%	2.0%	N	0	0	.950	50	N	16.3	4
NB	0.0%	2.0%	N	0	0	.950	100	N	15.0	4
SB	0.0%	2.0%	N	0	0	.950	100	N	15.0	4

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							21.9	0	A
2				*				*	*	*			*	*	*		26.9	3	A
3						*	*					*				*	35.4	3	A
4	*	*	*									*				*	6.7	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	13	134	269	.950	14	141	283
WB	0	984	118	.950	0	1036	124
NB	330	880	0	.950	347	926	0
SB	92	578	33	.950	97	608	35

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	155	2	1.05	162	0.09	0.00
EB	RT	283	1	1.00	283	0.00	1.00
WB	TH-RT	1160	3	1.10	1276	0.00	0.11
NB	LT	347	1	1.00	347	1.00	0.00
NB	TH	926	2	1.05	973	0.00	0.00
SB	LT-TH-RT	740	3	1.10	814	0.13	0.05

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	1036	124	0	0	0	0	3	0	0
NORTHBOUND	97	608	35	100	100	100	0	3	0	740
SOUTHBOUND	347	926	0	0	55	0	1	2	0	510

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.983	3385
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.839	1.000	1445
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.979	1.000	5059
NB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1637

```
NB  TH         1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3446
SB  LT-TH-RT   1800  3 0.967 0.990 1.000 1.000 1.000 1.000 0.991 0.828 4240

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C    G  N   Va   Vm  Vlt  Plt No   Vo Plto
SB 100   27  3  740  740   97 0.13  2  510 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
SB 3600 0.142 14.839 0.556 0.683 12.075 0.317  0.926    2.023 0.484 0.828

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP     v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH      162 3385 0.05 0.07  228 0.71     *
EB  RT         283 1445 0.20 0.29  414 0.68
WB  TH-RT     1276 5059 0.25 0.35 1792 0.71     *
NB  LT         347 1637 0.15 0.22  491 0.71     *
NB  TH         973 3446 0.28 0.49 1683 0.58
SB  LT-TH-RT   814 4240 0.19 0.27 1141 0.71     *

CYCLE=100.0  LOST= 9.0  SUM V/S CRIT= 0.65 TOTAL V/C= 0.71
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  64 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH    0.71 0.07 100.0 34.72  228   6.72 0.67  27.93  D   4.0     4
EB  RT       0.68 0.29 100.0 24.05  414   3.17 0.66  18.00  C   5.6     6
WB  TH-RT    0.71 0.35 100.0 21.19 1792   0.95 0.67  14.93  B  20.8    21
NB  LT       0.71 0.49 100.0 15.19  491   3.19 1.00  18.38  C   7.5     8
NB  TH       0.58 0.49 100.0 13.86 1683   0.37 0.62   8.82  B  13.2    13
SB  LT-TH-RT 0.71 0.27 100.0 25.12 1141   1.49 0.67  17.96  C  15.0    15

DIR Delay LOS
EB  21.62  C
WB  14.93  B
NB  11.34  B
SB  17.96  C
INTERSECTION DELAY = 15.11 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  28.2 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  21.8 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  27.0 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  35.5 secs green,   3.0 secs yellow + red clear
suggested timing phase 4 is   6.7 secs green,   3.0 secs yellow + red clear
```

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
MASTER PLAN DESIGN (W/TREMONT ACCESS - EB DBL TH) - AM PEAK HOUR
date:08-22-1989 time:13:11:34
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2MPTAM GEOMETRICS=P18I2MT SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	9	114	194	0	2	1	0.0	11.0	11.0	44
WB	0	1653	68	0	3	0	0.0	11.0	0.0	49
NB	525	923	0	1	2	0	11.0	11.0	0.0	56
SB	62	503	15	0	3	0	0.0	11.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	100	N 16.3	4
WB	0.0%	2.0%	N	0	0	.950	50	N 16.3	4
NB	0.0%	2.0%	N	0	0	.950	100	N 15.0	4
SB	0.0%	2.0%	N	0	0	.950	100	N 15.0	4

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							31.0	0	A
2				*				*	*	*			*	*	*		15.3	3	A
3						*	*					*				*	40.6	3	A
4	*	*	*									*				*	4.2	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	9	114	194	.950	9	120	204
WB	0	1653	68	.950	0	1740	72
NB	525	923	0	.950	553	972	0
SB	62	503	15	.950	65	529	16

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	129	2	1.05	136	0.07	0.00
EB	RT	204	1	1.00	204	0.00	1.00
WB	TH-RT	1812	3	1.10	1993	0.00	0.04
NB	LT	553	1	1.00	553	1.00	0.00
NB	TH	972	2	1.05	1020	0.00	0.00
SB	LT-TH-RT	611	3	1.10	672	0.11	0.03

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	1740	72	0	0	0	0	3	0	0
NORTHBOUND	65	529	16	100	100	100	0	3	0	611
SOUTHBOUND	553	972	0	0	33	0	1	2	0	320

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.986	3396
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.844	1.000	1455
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.992	1.000	5128
NB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1637

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NB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3446
SB  LT-TH-RT  1800  3 0.967 0.990 1.000 1.000 1.000 1.000 0.995 0.894 4598

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
SB 100  15  3  611  611   65 0.11  2  320 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
SB 3600 0.089  6.974 0.675 0.461  8.278 0.539  2.157    1.667 0.683 0.894

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH     136 3396 0.04 0.04  142 0.96     *
EB  RT        204 1455 0.14 0.35  512 0.40
WB  TH-RT    1993 5128 0.39 0.41 2080 0.96     *
NB  LT        553 1637 0.30 0.31  577 0.96     *
NB  TH       1020 3446 0.30 0.46 1594 0.64
SB  LT-TH-RT  672 4598 0.15 0.15  701 0.96     *

CYCLE=100.0  LOST= 9.0  SUM V/S CRIT= 0.87 TOTAL V/C= 0.96
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  1 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1     c      d2    PF   Delay LOS Avg Q  95% Q
EB  LT-TH    0.96 0.04 100.0 36.35  142   45.94 0.77  63.07  F   4.0     8
EB  RT       0.40 0.35 100.0 18.57  512    0.28 0.62  11.69  B   3.7     4
WB  TH-RT    0.96 0.41 100.0 21.96 2080    8.51 0.77  23.35  C  29.9    36
NB  LT       0.96 0.46 100.0 19.70  577   20.00 1.00  39.70  D  11.4    19
NB  TH       0.64 0.46 100.0 15.59 1594    0.62 0.64  10.38  B  14.5    15
SB  LT-TH-RT 0.96 0.15 100.0 31.96  701   17.68 0.77  38.04  D  14.4    20

DIR Delay LOS
EB  32.22  D
WB  23.35  C
NB  20.68  C
SB  38.04  D
INTERSECTION DELAY = 25.25 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 109.1 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
MASTER PLAN DESIGN (W/TREMONT ACCESS - EB DBL TH) - PM PEAK HOUR
date:08-22-1989 time:13:18:05
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2MPTPM GEOMETRICS=P18I2MT SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	20	446	423	0	2	1	0.0	11.0	11.0	44
WB	0	1650	51	0	3	0	0.0	11.0	0.0	49
NB	360	686	0	1	2	0	11.0	11.0	0.0	56
SB	81	613	24	0	3	0	0.0	11.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.930	100	N	16.3	4
WB	0.0%	2.0%	N	0	0	.930	50	N	16.3	4
NB	0.0%	2.0%	N	0	0	.930	100	N	15.0	4
SB	0.0%	2.0%	N	0	0	.930	100	N	15.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							18.7	0	A
2				*				*	*	*			*	*	*		18.6	3	A
3						*	*					*				*	38.6	3	A
4	*	*	*									*				*	15.2	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	20	446	423	.930	22	480	455
WB	0	1650	51	.930	0	1774	55
NB	360	686	0	.930	387	738	0
SB	81	613	24	.930	87	659	26

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	501	2	1.05	526	0.04	0.00
EB	RT	455	1	1.00	455	0.00	1.00
WB	TH-RT	1829	3	1.10	2012	0.00	0.03
NB	LT	387	1	1.00	387	1.00	0.00
NB	TH	738	2	1.05	775	0.00	0.00
SB	LT-TH-RT	772	3	1.10	849	0.11	0.03

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	1774	55	0	0	0	0	3	0	0
NORTHBOUND	87	659	26	100	100	100	0	3	0	772
SOUTHBOUND	387	738	0	0	50	0	1	2	0	368

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.992	3416
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.829	1.000	1428
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.994	1.000	5138
NB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1637

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NB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3446
SB  LT-TH-RT  1800  3 0.967 0.990 1.000 1.000 1.000 1.000 0.993 0.875 4492

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
SB 100  19  3  772  772   87 0.11  2  368 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf     El    Fm    Flt
SB 3600 0.102  9.297 0.645 0.512  9.265 0.488  1.839  1.744 0.625 0.875

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH     526 3416 0.15 0.15  518 1.01     *
EB  RT        455 1428 0.32 0.34  483 0.94
WB  TH-RT    2012 5138 0.39 0.39 1983 1.01     *
NB  LT        387 1637 0.19 0.19  385 1.00     *
NB  TH        775 3446 0.22 0.37 1283 0.60
SB  LT-TH-RT  849 4492 0.19 0.19  834 1.02     *

CYCLE=100.0  LOST= 9.0  SUM V/S CRIT= 0.92 TOTAL V/C= 1.01
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  11 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1     c      d2    PF   Delay LOS Avg Q  95% Q
EB  LT-TH    1.01 0.15 100.0 32.32  518   34.27 0.78   52.20  E  13.2    23
EB  RT       0.94 0.34 100.0 24.40  483   19.52 0.76   33.43  D   8.4    14
WB  TH-RT    1.01 0.39 100.0 23.55 1983   18.97 0.78   33.33  D  32.5    52
NB  LT       1.00 0.37 100.0 23.92  385   36.46 1.00   60.37  F  10.9    20
NB  TH       0.60 0.37 100.0 19.31 1283    0.59 0.62   12.37  B  12.9    13
SB  LT-TH-RT 1.02 0.19 100.0 31.08  834   28.63 0.85   50.75  E  19.6    34

DIR Delay LOS
EB  43.50  E
WB  33.33  D
NB  28.37  D
SB  50.75  E
INTERSECTION DELAY = 37.13 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 308.0 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  18.5 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  18.7 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  38.6 secs green,   3.0 secs yellow + red clear
suggested timing phase 4 is  15.2 secs green,   3.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
MASTER PLAN DESIGN (W/TREMONT ACCESS -EB DBL TH) - SAT PEAK HOUR
date:08-22-1989 time:13:26:27
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2MPTS GEOMETRICS=P18I2MT SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	13	134	269	0	2	1	0.0	11.0	11.0	44
WB	0	984	118	0	3	0	0.0	11.0	0.0	49
NB	250	880	0	1	2	0	11.0	11.0	0.0	56
SB	92	578	33	0	3	0	0.0	11.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	100	N 16.3	4
WB	0.0%	2.0%	N	0	0	.950	50	N 16.3	4
NB	0.0%	2.0%	N	0	0	.950	100	N 15.0	4
SB	0.0%	2.0%	N	0	0	.950	100	N 15.0	4

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							17.8	0	A
2				*				*	*	*			*	*	*		28.6	3	A
3						*	*					*				*	36.8	3	A
4	*	*	*									*				*	7.9	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	13	134	269	.950	14	141	283
WB	0	984	118	.950	0	1036	124
NB	250	880	0	.950	263	926	0
SB	92	578	33	.950	97	608	35

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	155	2	1.05	162	0.09	0.00
EB	RT	283	1	1.00	283	0.00	1.00
WB	TH-RT	1160	3	1.10	1276	0.00	0.11
NB	LT	263	1	1.00	263	1.00	0.00
NB	TH	926	2	1.05	973	0.00	0.00
SB	LT-TH-RT	740	3	1.10	814	0.13	0.05

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	1036	124	0	0	0	0	3	0	0
NORTHBOUND	97	608	35	100	100	100	0	3	0	740
SOUTHBOUND	263	926	0	0	62	0	1	2	0	571

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.983	3385
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.835	1.000	1439
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.979	1.000	5059
NB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1637

```
NB  TH         1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3446
SB  LT-TH-RT   1800  3 0.967 0.990 1.000 1.000 1.000 1.000 0.991 0.810 4148

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C    G  N   Va   Vm  Vlt  Plt No   Vo Plto
SB 100  29  3  740  740   97 0.13  2  571 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
SB 3600 0.159 15.097 0.518 0.738 13.468 0.262  0.711    2.171 0.430 0.810

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH     162 3385 0.05 0.08  267 0.61
EB  RT        283 1439 0.20 0.26  369 0.77     *
WB  TH-RT    1276 5059 0.25 0.37 1860 0.69     *
NB  LT        263 1637 0.11 0.18  436 0.60
NB  TH        973 3446 0.28 0.46 1596 0.61
SB  LT-TH-RT  814 4148 0.20 0.29 1185 0.69     *

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.65 TOTAL V/C= 0.69
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  76 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1     c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH    0.61 0.08 100.0  33.86  267    2.81 0.62   22.88  C   4.0    4
EB  RT       0.77 0.26 100.0  26.14  369    6.38 0.70   22.68  C   5.8    6
WB  TH-RT    0.69 0.37 100.0  20.32 1860    0.75 0.66   13.95  B  20.4   20
NB  LT       0.60 0.46 100.0  15.19  436    1.70 1.00   16.89  C   6.0    6
NB  TH       0.61 0.46 100.0  15.25 1596    0.50 0.62    9.83  B  13.8   14
SB  LT-TH-RT 0.69 0.29 100.0  24.13 1185    1.18 0.66   16.77  C  14.7   15

DIR Delay LOS
EB  22.75  C
WB  13.95  B
NB  11.34  B
SB  16.77  C
INTERSECTION DELAY = 14.74 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  18.7 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  17.7 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  28.6 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  36.7 secs green,   3.0 secs yellow + red clear
suggested timing phase 4 is   7.9 secs green,   3.0 secs yellow + red clear
```

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:08-04-1989 TIME:16:06:49
TREMONT/SITE DRIVE - MASTER PLAN DESIGN (TREMONT RGT IN/OUT) - AM PEAK HOUR

LAST DATASETS LOADED OR SAVED
VOLUME=I3MPRAM GEOMETRICS=P18INT3A
KEY: A- -B
|
C

GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
FROM C RT LANE: STOP
PREVAILING SPEED: 30 MPH
MAIN STREET # OF LANES: 4 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: N

MINOR STREET LANES
APPROACH: C: SITE DRIVE
SHARED LEFT AND RIGHT TURN LANE: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)

APPROACH	A: TREMONT SB	B: TREMONT NB	C: SITE DRIVE
LEFTS	0.00	0.00	0.00
THRUS	0.00	0.00	0.00
RIGHTS	0.00	0.00	0.00

APPROACH	A: TREMONT SB			B: TREMONT NB			C: SITE DRIVE		
	LT	TH	RT	LT	TH	RT	LT	TH	RT
VOLUME	0	~~1248~~	57	0	1600	0	0	0	88
PHF	0.95			0.95			0.95		
ADJ VOLUME	0	1314	60	0	1684	0	0	0	93
PERCENT GRADE	0.00			0.00			0.00		
PASS CAR/HR	0			0			0	0	102

STEP 1 RIGHT TURNS FROM C:SITE DRIVE

CONFLICTING FLOWS	687
CRITICAL GAPS	5.0
CAPACITY	578
ACTUAL CAPACITY	578

STEP 2 LEFT TURNS FROM B:TREMONT NB

CONFLICTING FLOWS	1374
CRITICAL GAPS	5.0
CAPACITY	243
CAPACITY USED	0%
IMPEDANCE FACTOR	1.00
ACTUAL CAPACITY	243

1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 2 of 2)
DATE:08-04-1989 TIME:16:06:49
TREMONT/SITE DRIVE - MASTER PLAN DESIGN (TREMONT RGT IN/OUT) - AM PEAK HOUR

STEP 3 LEFT TURNS FROM	C:SITE DRIVE
CONFLICTING FLOWS	3028
CRITICAL GAPS	6.5
CAPACITY	1
ACTUAL CAPACITY	1

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT

MOVEMENT	DEMAND	CAPACITY	RESERVE	LOS	AVG DEL(SEC)	AVG QUEUE
RT FROM C:	102	578	477	A	7.55	0.00

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 10 : UNSIGNALIZED - 3 APPROACHES (PAGE 1 of 2)
DATE:08-04-1989 TIME:16:21:15
TREMONT/SITE DRIVE - MASTER PLAN DESIGN (TREMONT RGT IN/OUT) - PM PEAK HOUR

LAST DATASETS LOADED OR SAVED
VOLUME=I3MPRPM GEOMETRICS=P18INT3B
KEY: A- -B
|
C

GENERAL CHARACTERISTICS
POPULATION GREATER THAN 250,000: YES
CONTROLS: FROM C: STOP
FROM C RT LANE: STOP
PREVAILING SPEED: 30 MPH
MAIN STREET # OF LANES: 4 LANES
MAIN STREET APPROACH A - EXCLUSIVE RIGHT TURN LANE: N

MINOR STREET LANES
APPROACH: C: SITE DRIVE
SHARED LEFT AND RIGHT TURN LANE: NO
LARGE RIGHT TURN RADIUS OR SHALLOW RIGHT TURN ANGLE: NO
RIGHT TURN ACCELERATION LANE ON MAJOR: NO

SIGHT DISTANCE RESTRICTIONS (in seconds)

APPROACH	A: TREMONT SB	B: TREMONT NB	C: SITE DRIVE
LEFTS	0.00	0.00	0.00
THRUS	0.00	0.00	0.00
RIGHTS	0.00	0.00	0.00

APPROACH	A: TREMONT SB			B: TREMONT NB			C: SITE DRIVE		
	LT	TH	RT	LT	TH	RT	LT	TH	RT
VOLUME	0	1537	20	0	1400	0	0	0	278
PHF	0.95			0.95			0.95		
ADJ VOLUME	0	1618	21	0	1474	0	0	0	293
PERCENT GRADE	0.00			0.00			0.00		
PASS CAR/HR	0			0			0	0	322

STEP 1 RIGHT TURNS FROM C:SITE DRIVE

CONFLICTING FLOWS	819
CRITICAL GAPS	5.0
CAPACITY	495
ACTUAL CAPACITY	495

STEP 2 LEFT TURNS FROM B:TREMONT NB

CONFLICTING FLOWS	1639
CRITICAL GAPS	5.0
CAPACITY	165
CAPACITY USED	0%
IMPEDANCE FACTOR	1.00
ACTUAL CAPACITY	165

DATE:08-04-1989 TIME:16:24:55
TREMONT/SITE DRIVE - MASTER PLAN DESIGN (TREMONT RGT IN/OUT) - SAT PEAK HOUR

STEP 3 LEFT TURNS FROM	C:SITE DRIVE
CONFLICTING FLOWS	2522
CRITICAL GAPS	6.5
CAPACITY	10
ACTUAL CAPACITY	10

SUMMARY OF LEVEL OF SERVICE BY MOVEMENT

MOVEMENT	DEMAND	CAPACITY	RESERVE	LOS	AVG DEL(SEC)	AVG QUEUE
RT FROM C:	143	658	515	A	6.99	0.00

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/SITE/RUGGLES
MASTER PLAN DESIGN (W/TREMONT ACCESS - NB LFT ACTUATED ONLY) - AM PEAK HOUR
date:08-10-1989 time:17:04:01
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I3LMPAM GEOMETRICS=P18I3L SIGNAL=P18I3L
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	0	0	0	0	0	0.0	0.0	0.0	50
WB	0	0	0	0	0	0	0.0	0.0	0.0	0
NB	200	2050	0	1	3	0	11.0	11.0	0.0	42
SB	0	1815	57	0	3	0	0.0	11.0	0.0	42

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	0.0%	N	0	0	.000	100	N	16.5	0
WB	0.0%	0.0%	N	0	0	.000	0	N	16.5	0
NB	0.0%	2.0%	N	0	0	.950	0	N	17.5	5
SB	0.0%	2.0%	N	0	0	.950	100	N	17.5	5

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1									*	*						*	22.0	3	A
2			*							*	*			*	*		72.0	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	0	0	.000	0	0	0
WB	0	0	0	.000	0	0	0
NB	200	2050	0	.950	211	2158	0
SB	0	1815	57	.950	0	1911	60

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
NB	LT	211	1	1.00	211	1.00	0.00
NB	TH	2158	3	1.10	2374	0.00	0.00
SB	TH-RT	1971	3	1.10	2168	0.00	0.03

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
NORTHBOUND	0	1911	60	0	0	0	0	3	0	0

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
NB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1637
NB	TH	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	1.000	1.000	5168
SB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.994	1.000	5137

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
NB	LT	211	1637	0.13	0.22	359	0.59	*
NB	TH	2374	5168	0.46	1.00	5168	0.46	
SB	TH-RT	2168	5137	0.42	0.72	3701	0.59	*

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.55 TOTAL V/C= 0.59

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
NB	LT	0.59	0.22	100.0	26.56	359	1.80	1.00	28.36	D	4.6	6
NB	TH	0.46	1.00	100.0	0.00	5168	0.05	0.40	0.02	A	0.0	1
SB	TH-RT	0.59	0.72	100.0	5.14	3701	0.18	0.40	2.13	A	15.3	15

DIR	Delay	LOS
NB	2.33	A
SB	2.13	A

INTERSECTION DELAY = 2.24 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF 30 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 14.3 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/SITE/RUGGLES
MASTER PLAN DESIGN (W/TREMONT ACCESS - NB ACTUATED ONLY) - PM PEAK HOUR
date:08-10-1989 time:17:08:35
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I3LMPPM GEOMETRICS=P18I3L SIGNAL=P18I3L
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	0	0	0	0	0	0.0	0.0	0.0	50
WB	0	0	0	0	0	0	0.0	0.0	0.0	0
NB	87	1879	0	1	3	0	11.0	11.0	0.0	42
SB	0	2285	19	0	3	0	0.0	11.0	0.0	42

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	0.0%	N	0	0	.000	100	N	16.5	0
WB	0.0%	0.0%	N	0	0	.000	0	N	16.5	0
NB	0.0%	2.0%	N	0	0	.950	0	N	17.5	5
SB	0.0%	2.0%	N	0	0	.950	100	N	17.5	5

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1									*	*						*	9.2	3	A
2			*							*	*			*	*		84.8	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	0	0	.000	0	0	0
WB	0	0	0	.000	0	0	0
NB	87	1879	0	.950	92	1978	0
SB	0	2285	19	.950	0	2405	20

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
NB	LT	92	1	1.00	92	1.00	0.00
NB	TH	1978	3	1.10	2176	0.00	0.00
SB	TH-RT	2425	3	1.10	2668	0.00	0.01

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
NORTHBOUND	0	2405	20	0	0	0	0	3	0	0

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
NB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1637
NB	TH	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	1.000	1.000	5168
SB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.998	1.000	5160

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
NB	LT	92	1637	0.06	0.09	150	0.61	*
NB	TH	2176	5168	0.42	1.00	5168	0.42	
SB	TH-RT	2668	5160	0.52	0.85	4377	0.61	*

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.57 TOTAL V/C= 0.61

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
NB	LT	0.61	0.09	100.0	33.20	150	4.87	1.00	38.07	D	2.3	4
NB	TH	0.42	1.00	100.0	0.00	5168	0.03	0.40	0.01	A	0.0	1
SB	TH-RT	0.61	0.85	100.0	1.81	4377	0.18	0.40	0.81	A	10.2	10

DIR	Delay	LOS
NB	1.55	A
SB	0.81	A

INTERSECTION DELAY = 1.15 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF 30 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 15.1 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/SITE/RUGGLES
MASTER PLAN DESIGN (W/TREMONT ACCESS - NB ACTUATED ONLY) - SAT PEAK HOUR
date:08-10-1989 time:18:15:20
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I3LMPS GEOMETRICS=P18I3L SIGNAL=P18I3L
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	0	0	0	0	0	0.0	0.0	0.0	50
WB	0	0	0	0	0	0	0.0	0.0	0.0	0
NB	80	1638	0	1	3	0	11.0	11.0	0.0	42
SB	0	1575	18	0	3	0	0.0	11.0	0.0	42

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	0.0%	N	0	0	.000	100	N	16.5	0
WB	0.0%	0.0%	N	0	0	.000	0	N	16.5	0
NB	0.0%	2.0%	N	0	0	.950	0	N	17.5	5
SB	0.0%	2.0%	N	0	0	.950	100	N	17.5	5

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1									*	*						*	11.8	3	A
2			*							*	*			*	*		82.2	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	0	0	.000	0	0	0
WB	0	0	0	.000	0	0	0
NB	80	1638	0	.950	84	1724	0
SB	0	1575	18	.950	0	1658	19

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
NB	LT	84	1	1.00	84	1.00	0.00
NB	TH	1724	3	1.10	1897	0.00	0.00
SB	TH-RT	1677	3	1.10	1845	0.00	0.01

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
NORTHBOUND	0	1658	19	0	0	0	0	3	0	0

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
NB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1637
NB	TH	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	1.000	1.000	5168
SB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.998	1.000	5157

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
NB	LT	84	1637	0.05	0.12	193	0.44	*
NB	TH	1897	5168	0.37	1.00	5168	0.37	
SB	TH-RT	1845	5157	0.36	0.82	4238	0.44	*

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.41 TOTAL V/C= 0.44

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
NB	LT	0.44	0.12	100.0	31.15	193	1.02	1.00	32.17	D	2.1	3
NB	TH	0.37	1.00	100.0	0.00	5168	0.02	0.40	0.01	A	0.0	1
SB	TH-RT	0.44	0.82	100.0	1.88	4238	0.05	0.40	0.77	A	8.3	8

DIR	Delay	LOS
NB	1.38	A
SB	0.77	A

INTERSECTION DELAY = 1.08 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 10.5 SECONDS
THE EXISTING TIMING IS OPTIMAL

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
RUGGLES STREET/BUSWAY (OUTBOUND)
MASTER PLAN DESIGN: AM PEAK HOUR
date:08-18-1989              time:14:47:05
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I4MPAM     GEOMETRICS=P18INT4F   SIGNAL=P18INT4
LOCATED IN CBD:N
VOLUME & GEOMETRICS
        VOLUMES       # OF LANES      LANE WIDTH      CROSS
DIR  LT   TH   RT     LT TH RT       LT   TH   RT     WALK
EB    0  971    0      0  2  0      0.0 12.0  0.0     50
WB    0 1136    0      0  2  0      0.0 12.0  0.0     50
NB    0    0    0      0  0  0      0.0  0.0  0.0      0
SB  114    0   27      1  0  1     15.0  0.0 15.0     36

TRAFFIC & ROADWAY CONDITIONS
                  ADJ PARK              PEDESTRIANS          ARR
DIR GRADE %HV     Y/N MOVES BUSES  PHF CROSS BUT MIN TIME TYPE
EB  0.0%  2.0%     N      0     0  .860  200   N    16.5    3
WB  0.0%  2.0%     N      0     0  .860  200   N    16.5    3
NB  0.0%  0.0%     N      0     0  .000    0   N    13.0    0
SB  2.0% %100.0%   N      0     0  .860  100   N    13.0    3

PHASINGS
    EASTBOUND   WESTBOUND   NORTHBOUND  SOUTHBOUND GREEN  Y+R PRE/ACT
    l  t  r  p  l  t  r  p  l  t  r  p  l  t  r  p
 1  *  *        *  *                             *  73.8   3    A
 2        *           *                 *     *     20.2   3    A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)
DIR  LTV  THV  RTV   PHF  LTFR THFR RTFR
EB     0  971    0  .860     0 1129    0
WB     0 1136    0  .860     0 1321    0
NB     0    0    0  .000     0    0    0
SB   114    0   27  .860   133    0   31

PART 2 (LANE GROUP ADJUSTMENTS)
DIR LN GROUP  FLOW N   LU    v  Plt  Prt
EB  TH        1129 2 1.05 1186 0.00 0.00
WB  TH        1321 2 1.05 1387 0.00 0.00
SB  LT         133 1 1.00  133 1.00 0.00
SB  RT          31 1 1.00   31 0.00 1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)
LEFT TURN              OPPOSING APPROACH
BEING OPPOSED       VOLUMES      % OPPOSING LEFT TURN    # LANES     OPPOSING
                  LT   TH   RT        LT   TH   RT       LT  TH  RT    VOLUME
SOUTHBOUND         0    0    0         0    0    0        0   0   0       0

SATURATION FLOW ADJUSTMENT WORKSHEET
DIR LN GROUP  IDEAL N  Fwid   Fhv   Fgr Fpark  Fbus Farea   Frt   Flt    s
EB  TH        1800  2 1.000 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3564
WB  TH        1800  2 1.000 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3564
SB  LT        1800  1 1.100 0.667 0.990 1.000 1.000 1.000 1.000 0.950 1241
SB  RT        1800  1 1.100 0.667 0.990 1.000 1.000 1.000 0.755 1.000  986

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH       1186 3564 0.33 0.74 2629 0.45
WB  TH       1387 3564 0.39 0.74 2629 0.53      *
SB  LT        133 1241 0.11 0.20  251 0.53      *
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SB  RT          31  986 0.03 0.20  200 0.16

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.50 TOTAL V/C= 0.53

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C      d1     c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.45 0.74 100.0   3.92 2629    0.09 0.85    3.41  A   8.2    8
WB  TH       0.53 0.74 100.0   4.28 2629    0.16 0.85    3.78  A   9.6   10
SB  LT       0.53 0.20 100.0  27.06  251    1.65 1.00   28.72  D   2.9    4
SB  RT       0.16 0.20 100.0  24.97  200    0.03 0.85   21.25  C   0.7    1

DIR Delay LOS
EB   3.41  A
WB   3.78  A
SB  27.29  D
INTERSECTION DELAY =  5.03 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  12.6 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
RUGGLES STREET/BUSWAY (OUTBOUND)
MASTER PLAN DESIGN: PM PEAK HOUR
date:08-18-1989 time:15:00:06
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I4MPPM GEOMETRICS=P18INT4F SIGNAL=P18INT4
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	1095	0	0	2	0	0.0	12.0	0.0	50
WB	0	1745	0	0	2	0	0.0	12.0	0.0	50
NB	0	0	0	0	0	0	0.0	0.0	0.0	0
SB	88	0	15	1	0	1	15.0	0.0	15.0	36

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.970	200	N	16.5	3
WB	0.0%	2.0%	N	0	0	.970	200	N	16.5	3
NB	0.0%	0.0%	N	0	0	.860	0	N	13.0	3
SB	2.0%	%100.0%	N	0	0	.860	100	N	13.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*			*	*										*	81.3	3	A
2			*				*							*			12.7	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	1095	0	.970	0	1129	0
WB	0	1745	0	.970	0	1799	0
NB	0	0	0	.860	0	0	0
SB	88	0	15	.860	102	0	17

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	1129	2	1.05	1185	0.00	0.00
WB	TH	1799	2	1.05	1889	0.00	0.00
SB	LT	102	1	1.00	102	1.00	0.00
SB	RT	17	1	1.00	17	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
SOUTHBOUND	0	0	0	0	0	0	0	0	0	0

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3564
WB	TH	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3564
SB	LT	1800	1	1.100	0.667	0.990	1.000	1.000	1.000	1.000	0.950	1241
SB	RT	1800	1	1.100	0.667	0.990	1.000	1.000	1.000	0.755	1.000	986

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	1185	3564	0.33	0.81	2900	0.41	
WB	TH	1889	3564	0.53	0.81	2900	0.65	*
SB	LT	102	1241	0.08	0.13	157	0.65	*

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SB  RT          17  986 0.02 0.13  125 0.14

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.61 TOTAL V/C= 0.65

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH       0.41 0.81 100.0   1.98 2900    0.06 0.85    1.73  A   5.8    6
WB  TH       0.65 0.81 100.0   2.81 2900    0.38 0.85    2.71  A   9.3    9
SB  LT       0.65 0.13 100.0  31.60  157    6.23 1.00   37.83  D   2.5    4
SB  RT       0.14 0.13 100.0  29.51  125    0.03 0.85   25.12  D   0.4    1

DIR Delay LOS
EB   1.73  A
WB   2.71  A
SB  35.98  D
INTERSECTION DELAY =  3.59 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  16.9 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
RUGGLES STREET/BUSWAY (OUTBOUND)
MASTER PLAN DESIGN: SAT PEAK HOUR
date:08-18-1989 time:15:03:48
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I4MPSAT GEOMETRICS=P18INT4F SIGNAL=P18INT4
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	1135	0	0	2	0	0.0	12.0	0.0	50
WB	0	917	0	0	2	0	0.0	12.0	0.0	50
NB	0	0	0	0	0	0	0.0	0.0	0.0	0
SB	75	0	15	1	0	1	15.0	0.0	15.0	36

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.880	100	N	16.5	3
WB	0.0%	2.0%	N	0	0	.880	100	N	16.5	3
NB	0.0%	0.0%	N	0	0	.860	0	N	13.0	3
SB	2.0%	%100.0%	N	0	0	.880	100	N	13.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*				*	*									*	79.6	3	A
2			*					*						*		*	14.4	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	1135	0	.880	0	1290	0
WB	0	917	0	.880	0	1042	0
NB	0	0	0	.860	0	0	0
SB	75	0	15	.880	85	0	17

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	1290	2	1.05	1354	0.00	0.00
WB	TH	1042	2	1.05	1094	0.00	0.00
SB	LT	85	1	1.00	85	1.00	0.00
SB	RT	17	1	1.00	17	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
SOUTHBOUND	0	0	0	0	0	0	0	0	0	0

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3564
WB	TH	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3564
SB	LT	1800	1	1.100	0.667	0.990	1.000	1.000	1.000	1.000	0.950	1241
SB	RT	1800	1	1.100	0.667	0.990	1.000	1.000	1.000	0.802	1.000	1049

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	1354	3564	0.38	0.80	2838	0.48	*
WB	TH	1094	3564	0.31	0.80	2838	0.39	
SB	LT	85	1241	0.07	0.14	179	0.48	*

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SB  RT          17 1049 0.02 0.14  151 0.11

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.45 TOTAL V/C= 0.48

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C      d1     c      d2   PF    Delay LOS Avg Q  95% Q
EB  TH        0.48 0.80 100.0   2.55 2838    0.10 0.85    2.25  A   7.3    7
WB  TH        0.39 0.80 100.0   2.28 2838    0.05 0.85    1.98  A   5.9    6
SB  LT        0.48 0.14 100.0  29.91  179    1.55 1.00   31.46  D   2.0    3
SB  RT        0.11 0.14 100.0  28.31  151    0.01 0.85   24.08  C   0.4    1

DIR Delay LOS
EB   2.25  A
WB   1.98  A
SB  30.23  D
INTERSECTION DELAY =  3.25 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  11.4 SECONDS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/PRENTISS
MASTER PLAN DESIGN - AM PEAK HOUR
date:08-17-1989 time:11:39:06
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I5MPAM GEOMETRICS=P18INT5 SIGNAL=P18INT5
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	70	0	25	0	1	0	0.0	13.0	0.0	26
WB	0	0	0	0	0	0	0.0	0.0	0.0	0
NB	295	2172	0	0	3	0	0.0	11.0	0.0	68
SB	0	1019	125	0	3	0	0.0	11.0	0.0	68

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.960	100	N	10.5	3
WB	0.0%	0.0%	N	0	0	.000	0	N	10.5	0
NB	0.0%	2.0%	N	0	5	.960	100	N	21.0	3
SB	0.0%	2.0%	N	0	5	.960	50	N	21.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*						*			*	*			85.0	3	A
2	*		*									*			*	*	9.0	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	70	0	25	.960	73	0	26
WB	0	0	0	.000	301	355	0
NB	295	2172	0	.960	307	2263	0
SB	0	1019	125	.960	0	1061	130

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-RT	99	1	1.00	99	0.74	0.26
NB	LT-TH	2570	3	1.10	2827	0.12	0.00
SB	TH-RT	1192	3	1.10	1311	0.00	0.11

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	301	355	0	0	0	0	0	0	0	0
NORTHBOUND	0	1061	130	100	100	85	0	3	0	1172

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-RT	1800	1	1.033	0.990	1.000	1.000	1.000	1.000	0.852	0.783	1228
NB	LT-TH	1800	3	0.967	0.990	1.000	1.000	0.993	1.000	1.000	0.722	3708
SB	TH-RT	1800	3	0.967	0.990	1.000	1.000	0.993	1.000	0.979	1.000	5024

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
NB	100	85	3	2570	1399	307	0.12	3	1172	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
NB	5400	0.217	80.861	0.142	1.000	4.154	0.000	0.000	7.900	0.167	0.722

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-RT	99	1228	0.08	0.09	110	0.90	*
NB	LT-TH	2827	3708	0.76	0.85	3152	0.90	*
SB	TH-RT	1311	5024	0.26	0.85	4271	0.31	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.84 TOTAL V/C= 0.90

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-RT	0.90	0.09	100.0	34.24	110	37.79	1.00	72.02	F	3.2	7
NB	LT-TH	0.90	0.85	100.0	3.59	3152	2.79	0.85	5.43	B	10.7	13
SB	TH-RT	0.31	0.85	100.0	1.15	4271	0.01	0.85	0.99	A	5.0	5

DIR	Delay	LOS
EB	72.02	F
NB	5.43	B
SB	0.99	A

INTERSECTION DELAY = 5.61 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 53.2 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/PRENTISS
MASTER PLAN DESIGN - PM PEAK HOUR
date:08-17-1989 time:12:07:27
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I5MPPM GEOMETRICS=P18INT5 SIGNAL=P18INT5
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	96	0	64	0	1	0	0.0	13.0	0.0	26
WB	0	0	0	0	0	0	0.0	0.0	0.0	0
NB	111	1549	0	0	3	0	0.0	11.0	0.0	68
SB	0	1837	99	0	3	0	0.0	11.0	0.0	68

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	100	N	10.5	3
WB	0.0%	0.0%	N	0	0	.000	0	N	10.5	0
NB	0.0%	2.0%	N	0	5	.950	100	N	21.0	3
SB	0.0%	2.0%	N	0	5	.950	100	N	21.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*						*		*				*	74.9	3	A
2	*			*								*				*	19.1	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	96	0	64	.950	101	0	67
WB	0	0	0	.000	0	0	0
NB	111	1549	0	.950	117	1631	0
SB	0	1837	99	.950	0	1934	104

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-RT	168	1	1.00	168	0.60	0.40
NB	LT-TH	1747	3	1.10	1922	0.07	0.00
SB	TH-RT	2038	3	1.10	2242	0.00	0.05

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	0	0	0	0	0	0	0	0	0
NORTHBOUND	0	1934	104	100	100	75	0	3	0	1399

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-RT	1800	1	1.033	0.990	1.000	1.000	1.000	1.000	0.827	0.790	1204
NB	LT-TH	1800	3	0.967	0.990	1.000	1.000	0.993	1.000	1.000	0.685	3514
SB	TH-RT	1800	3	0.967	0.990	1.000	1.000	0.993	1.000	0.990	1.000	5083

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
NB	100	75	3	1747	1399	117	0.07	3	1399	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
NB	5400	0.259	66.059	0.001	1.000	8.793	0.000	0.000	1800.000	0.054	0.685

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-RT	168	1204	0.14	0.19	230	0.73	*
NB	LT-TH	1922	3514	0.55	0.75	2630	0.73	*
SB	TH-RT	2242	5083	0.44	0.75	3805	0.59	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.69 TOTAL V/C= 0.73

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-RT	0.73	0.19	100.0	28.88	230	7.55	1.00	36.43	D	3.8	6
NB	LT-TH	0.73	0.75	100.0	5.30	2630	0.75	0.85	5.15	B	12.2	12
SB	TH-RT	0.59	0.75	100.0	4.30	3805	0.18	0.85	3.81	A	14.2	14

DIR	Delay	LOS
EB	36.43	D
NB	5.15	B
SB	3.81	A

INTERSECTION DELAY = 5.67 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 21.7 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/PRENTISS
MASTER PLAN DESIGN - SAT PEAK HOUR
date:08-17-1989 time:12:47:42
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I5MPS GEOMETRICS=P18INT5 SIGNAL=P18INT5
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	25	0	26	0	1	0	0.0	13.0	0.0	26
WB	0	0	0	0	0	0	0.0	0.0	0.0	0
NB	55	1687	0	0	3	0	0.0	11.0	0.0	68
SB	0	1492	44	0	3	0	0.0	11.0	0.0	68

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.930	100	N	10.5	3
WB	0.0%	0.0%	N	0	0	.000	0	N	10.5	0
NB	0.0%	2.0%	N	0	5	.930	100	N	21.0	3
SB	0.0%	2.0%	N	0	5	.930	100	N	21.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*						*	*			*	*			87.2	3	A
2	*		*									*		*	*		6.8	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	25	0	26	.930	27	0	28
WB	0	0	0	.000	0	0	0
NB	55	1687	0	.930	59	1814	0
SB	0	1492	44	.930	0	1604	47

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-RT	55	1	1.00	55	0.49	0.51
NB	LT-TH	1873	3	1.10	2060	0.03	0.00
SB	TH-RT	1652	3	1.10	1817	0.00	0.03

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	0	0	0	0	0	0	0	0	0
NORTHBOUND	0	1604	47	100	100	87	0	3	0	1399

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-RT	1800	1	1.033	0.990	1.000	1.000	1.000	1.000	0.807	0.810	1204
NB	LT-TH	1800	3	0.967	0.990	1.000	1.000	0.993	1.000	1.000	0.682	3501
SB	TH-RT	1800	3	0.967	0.990	1.000	1.000	0.993	1.000	0.994	1.000	5104

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
NB	100	87	3	1873	1399	59	0.03	3	1399	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
NB	5400	0.259	82.791	0.001	1.000	4.458	0.000	0.000	1800.000	0.046	0.682

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-RT	55	1204	0.05	0.07	81	0.67	*
NB	LT-TH	2060	3501	0.59	0.87	3055	0.67	*
SB	TH-RT	1817	5104	0.36	0.87	4453	0.41	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.63 TOTAL V/C= 0.67

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-RT	0.67	0.07	100.0	34.62	81	12.84	1.00	47.46	E	1.4	3
NB	LT-TH	0.67	0.87	100.0	1.50	3055	0.42	0.85	1.64	A	6.6	7
SB	TH-RT	0.41	0.87	100.0	0.96	4453	0.04	0.85	0.85	A	5.8	6

DIR	Delay	LOS
EB	47.46	E
NB	1.64	A
SB	0.85	A

INTERSECTION DELAY = 1.91 INTERSECTION LOS=A

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 18.0 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
HUNTINGTON/RUGGLES
MASTER PLAN DESIGN (W/NO BUILD IMPROVEMENTS) - AM PEAK HOUR
date:08-13-1989 time:21:56:47
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I6MPAM GEOMETRICS=P18INT6M SIGNAL=P18INT6M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	519	12	0	2	0	0.0	10.0	0.0	29
WB	195	749	16	1	1	0	10.0	14.0	0.0	29
NB	0	679	305	0	2	1	0.0	10.0	9.0	49
SB	0	643	137	0	2	1	0.0	10.0	9.0	48

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.910	200	N	11.3	3
WB	0.0%	2.0%	N	2	0	.910	200	N	11.3	3
NB	0.0%	2.0%	N	0	10	.910	200	N	16.3	3
SB	0.0%	2.0%	N	0	10	.910	200	N	16.3	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*		*	*			*	*		32.6	3	A
2						*	*	*			*					*	13.8	0	A
3		*	*			*	*	*				*				*	47.7	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	519	12	.910	0	570	13
WB	195	749	16	.910	214	823	18
NB	0	679	305	.910	0	746	335
SB	0	643	137	.910	0	707	151

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH-RT	584	2	1.05	613	0.00	0.02
WB	LT	214	1	1.00	214	1.00	0.00
WB	TH-RT	841	1	1.00	841	0.00	0.02
NB	TH	746	2	1.05	783	0.00	0.00
NB	RT	335	1	1.00	335	0.00	1.00
SB	TH	707	2	1.05	742	0.00	0.00
SB	RT	151	1	1.00	151	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	570	13	100	100	100	0	2	0	584

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH-RT	1800	2	0.933	0.990	1.000	1.000	1.000	1.000	0.994	1.000	3308
WB	LT	1800	1	0.933	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1580
WB	TH-RT	1800	1	1.067	0.990	1.000	1.000	1.000	1.000	0.995	1.000	1891
NB	TH	1800	2	0.933	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3327
NB	RT	1800	1	0.900	0.990	1.000	1.000	0.958	1.000	0.783	1.000	1204
SB	TH	1800	2	0.933	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3327

```
SB  RT        1800  1 0.900 0.990 1.000 1.000 0.958 1.000 0.755 1.000 1160

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH-RT     613 3308 0.19 0.48 1577 0.39
WB  LT        214 1580 0.05 0.14  568 0.38
WB  TH-RT     841 1891 0.44 0.61 1162 0.72     *
NB  TH        783 3327 0.24 0.33 1083 0.72     *
NB  RT        335 1204 0.28 0.46  558 0.60
SB  TH        742 3327 0.22 0.33 1083 0.69
SB  RT        151 1160 0.13 0.33  378 0.40

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.68 TOTAL V/C= 0.72
FOR THE WESTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  283 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH-RT     0.39 0.48 100.0 12.77 1577   0.08 0.85   10.93  B   8.5    8
WB  LT        0.38 0.61 100.0  7.36  568   0.21 1.00    7.56  B   5.1    5
WB  TH-RT     0.72 0.61 100.0 10.17 1162   1.58 0.85    9.99  B   9.0    9
NB  TH        0.72 0.33 100.0 22.61 1083   1.69 0.85   20.66  C  14.0   14
NB  RT        0.60 0.46 100.0 15.17  558   1.32 0.85   14.01  B   5.0    5
SB  TH        0.69 0.33 100.0 22.25 1083   1.27 0.85   19.99  C  13.2   13
SB  RT        0.40 0.33 100.0 19.86  378   0.38 0.85   17.21  C   2.8    3

DIR Delay LOS
EB  10.93  B
WB   9.49  B
NB  18.67  C
SB  19.52  C
INTERSECTION DELAY = 14.95 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  21.1 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  32.6 secs green,   3.0 secs yellow + red clear
suggested timing phase 2 is  13.5 secs green,   0.0 secs yellow + red clear
suggested timing phase 3 is  48.0 secs green,   3.0 secs yellow + red clear
```

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
HUNTINGTON/RUGGLES
MASTER PLAN DESIGN (W/NO BUILD IMPROVEMENTS) - PM PEAK HOUR
date:08-13-1989 time:22:03:15
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I6MPPM GEOMETRICS=P18INT6M SIGNAL=P18INT6M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	555	41	0	2	0	0.0	10.0	0.0	29
WB	374	767	71	1	1	0	10.0	14.0	0.0	29
NB	0	887	550	0	2	1	0.0	10.0	9.0	49
SB	0	859	102	0	2	1	0.0	10.0	9.0	48

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.820	200	N	11.3	3
WB	0.0%	2.0%	N	0	0	.820	200	N	11.3	3
NB	0.0%	2.0%	N	0	10	.820	200	N	16.3	3
SB	0.0%	2.0%	N	0	10	.820	200	N	16.3	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*		*	*			*	*		36.0	3	A
2					*	*	*				*					*	27.9	0	A
3		*	*		*	*	*					*				*	30.0	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	555	41	.820	0	677	50
WB	374	767	71	.820	456	935	87
NB	0	887	550	.820	0	1082	671
SB	0	859	102	.820	0	1048	124

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH-RT	727	2	1.05	763	0.00	0.07
WB	LT	456	1	1.00	456	1.00	0.00
WB	TH-RT	1022	1	1.00	1022	0.00	0.08
NB	TH	1082	2	1.05	1136	0.00	0.00
NB	RT	671	1	1.00	671	0.00	1.00
SB	TH	1048	2	1.05	1100	0.00	0.00
SB	RT	124	1	1.00	124	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	677	50	100	100	100	0	2	0	727

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH-RT	1800	2	0.933	0.990	1.000	1.000	1.000	1.000	0.983	1.000	3271
WB	LT	1800	1	0.933	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1580
WB	TH-RT	1800	1	1.067	0.990	1.000	1.000	1.000	1.000	0.979	1.000	1861
NB	TH	1800	2	0.933	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3327
NB	RT	1800	1	0.900	0.990	1.000	1.000	0.958	1.000	0.796	1.000	1224
SB	TH	1800	2	0.933	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3327

```
SB  RT        1800  1 0.900 0.990 1.000 1.000 0.958 1.000 0.755 1.000 1160

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH-RT     763 3271 0.23 0.30  982 0.78
WB  LT        456 1580 0.22 0.28  585 0.78
WB  TH-RT    1022 1861 0.55 0.58 1079 0.95     *
NB  TH       1136 3327 0.34 0.36 1199 0.95     *
NB  RT        671 1224 0.55 0.64  783 0.86
SB  TH       1100 3327 0.33 0.36 1199 0.92
SB  RT        124 1160 0.11 0.36  418 0.30

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.89 TOTAL V/C= 0.95
FOR THE WESTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  77 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH-RT    0.78 0.30 100.0 24.27  982   2.80 0.85   23.00  C  14.1   15
WB  LT       0.78 0.58 100.0 12.26  585   4.65 1.00   16.91  C   9.1    9
WB  TH-RT    0.95 0.58 100.0 14.89 1079  11.95 0.85   22.82  C  12.4   20
NB  TH       0.95 0.36 100.0 23.60 1199  11.09 0.85   29.49  D  19.2   28
NB  RT       0.86 0.64 100.0 10.91  783   6.56 0.85   14.85  B   6.7    9
SB  TH       0.92 0.36 100.0 23.22 1199   8.07 0.85   26.60  D  18.6   24
SB  RT       0.30 0.36 100.0 17.41  418   0.12 0.85   14.90  B   2.2    2

DIR Delay LOS
EB  23.00  C
WB  20.99  C
NB  24.05  C
SB  25.41  D
INTERSECTION DELAY = 23.36 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  95.7 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  36.0 secs green,   3.0 secs yellow + red clear
suggested timing phase 2 is  28.0 secs green,   0.0 secs yellow + red clear
suggested timing phase 3 is  30.0 secs green,   3.0 secs yellow + red clear
```

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
HUNTINGTON/RUGGLES
MASTER PLAN DESIGN (W/NO BUILD IMPROVEMENTS) - SAT PEAK HOUR
date:08-13-1989 time:22:12:25
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I6MPS GEOMETRICS=P18INT6M SIGNAL=P18INT6M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	61	353	34	0	2	0	0.0	10.0	0.0	29
WB	156	417	32	1	1	0	10.0	14.0	0.0	29
NB	0	913	205	0	2	1	0.0	10.0	9.0	49
SB	0	877	133	0	2	1	0.0	10.0	9.0	48

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.940	100	N 11.3	3
WB	0.0%	2.0%	N	2	0	.940	100	N 11.3	3
NB	0.0%	2.0%	N	0	10	.940	200	N 16.3	3
SB	0.0%	2.0%	N	0	10	.940	200	N 16.3	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*		*	*			*	*		51.2	3	A
2					*	*	*				*					*	3.4	0	A
3	*	*	*		*	*	*					*				*	39.3	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	61	353	34	.940	65	376	36
WB	156	417	32	.940	166	444	34
NB	0	913	205	.940	0	971	218
SB	0	877	133	.940	0	933	141

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	477	2	1.05	500	0.14	0.08
WB	LT	166	1	1.00	166	1.00	0.00
WB	TH-RT	478	1	1.00	478	0.00	0.07
NB	TH	971	2	1.05	1020	0.00	0.00
NB	RT	218	1	1.00	218	0.00	1.00
SB	TH	933	2	1.05	980	0.00	0.00
SB	RT	141	1	1.00	141	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	166	444	34	0	92	92	1	1	0	440
WESTBOUND	65	376	36	100	100	100	0	2	0	477

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	0.933	0.990	1.000	1.000	1.000	1.000	0.981	0.745	2433
WB	LT	1800	1	0.933	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1580
WB	TH-RT	1800	1	1.067	0.990	1.000	1.000	1.000	1.000	0.983	1.000	1868
NB	TH	1800	2	0.933	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3327
NB	RT	1800	1	0.900	0.990	1.000	1.000	0.958	1.000	0.805	1.000	1238

```
SB  TH        1800  2 0.933 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3327
SB  RT        1800  1 0.900 0.990 1.000 1.000 0.958 1.000 0.802 1.000 1233

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
EB 100  39  2  477  477   65 0.14  1  440 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf      El    Fm   Flt
EB 1800 0.244 19.742 0.600 0.464 19.598 0.536  2.307   1.874 0.490 0.745

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT  500 2433 0.21 0.39  957 0.52
WB  LT        166 1580 0.02 0.03  365 0.45
WB  TH-RT     478 1868 0.26 0.43  799 0.60     *
NB  TH       1020 3327 0.31 0.51 1705 0.60     *
NB  RT        218 1238 0.18 0.55  677 0.32
SB  TH        980 3327 0.29 0.51 1705 0.57
SB  RT        141 1233 0.11 0.51  632 0.22

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.56 TOTAL V/C= 0.60
FOR THE WESTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  245 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C     d1     c     d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.52 0.39 100.0  17.60  957   0.43 0.85   15.33  C   8.0     8
WB  LT       0.45 0.43 100.0  15.46  365   0.64 1.00   16.10  C   4.5     4
WB  TH-RT    0.60 0.43 100.0  16.73  799   0.91 0.85   14.99  B   7.6     8
NB  TH       0.60 0.51 100.0  13.02 1705   0.43 0.85   11.44  B  13.2    13
NB  RT       0.32 0.55 100.0   9.48  677   0.10 0.85    8.15  B   2.7     3
SB  TH       0.57 0.51 100.0  12.80 1705   0.36 0.85   11.19  B  12.6    13
SB  RT       0.22 0.51 100.0  10.20  632   0.03 0.85    8.70  B   1.9     2

DIR Delay LOS
EB  15.33  C
WB  15.28  C
NB  10.86  B
SB  10.87  B
INTERSECTION DELAY = 12.31 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  14.7 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  51.2 secs green,   3.0 secs yellow + red clear
suggested timing phase 2 is   3.0 secs green,   0.0 secs yellow + red clear
suggested timing phase 3 is  39.8 secs green,   3.0 secs yellow + red clear
```

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/COLUMBUS/NEW DUDLEY
MASTER PLAN DESIGN - AM PEAK HOUR
date:08-13-1989 time:21:16:33
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I7MPAM GEOMETRICS=P18INT7 SIGNAL=P18INT7
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	245	238	224	0	2	0	0.0	12.0	0.0	50
WB	27	424	0	0	2	0	0.0	12.0	0.0	50
NB	449	1930	52	1	3	0	10.0	11.0	0.0	47
SB	202	576	190	1	3	0	10.0	11.0	0.0	46

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.940	200	N	16.5	3
WB	0.0%	2.0%	N	0	0	.940	300	N	16.5	3
NB	0.0%	2.0%	N	0	5	.940	300	N	15.8	3
SB	0.0%	2.0%	N	0	5	.940	200	N	15.8	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*									*				*	3.9	0	A
2	*	*	*		*	*						*				*	26.6	3	A
3				*				*	*					*			14.9	0	A
4				*				*	*	*	*			*	*	*	48.7	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	245	238	224	.940	261	253	238
WB	27	424	0	.940	29	451	0
NB	449	1930	52	.940	478	2053	55
SB	202	576	190	.940	215	613	202

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	752	2	1.05	790	0.35	0.32
WB	LT-TH	480	2	1.05	504	0.06	0.00
NB	LT	478	1	1.00	478	1.00	0.00
NB	TH-RT	2109	3	1.10	2319	0.00	0.03
SB	LT	215	1	1.00	215	1.00	0.00
SB	TH-RT	815	3	1.10	896	0.00	0.25

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	29	451	0	100	100	0	0	2	0	480
WESTBOUND	261	253	238	87	87	87	0	2	0	657
NORTHBOUND	215	613	202	100	100	100	1	3	0	815
SOUTHBOUND	478	2053	55	100	100	100	1	3	0	1399

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.907	0.857	2771
WB	LT-TH	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	1.000	0.665	2370
NB	LT	1800	1	0.933	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1580

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NB  TH-RT     1800  3 0.967 0.990 1.000 1.000 0.993 1.000 0.992 1.000 5093
SB  LT        1800  1 0.933 0.990 1.000 1.000 1.000 1.000 1.000 0.950 1580
SB  TH-RT     1800  3 0.967 0.990 1.000 1.000 0.993 1.000 0.939 1.000 4820

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB 100  27  2  480  480   29 0.06  2  657 0.35
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf     El    Fm   Flt
WB 2704 0.243  3.055 0.464 0.329 23.551 0.671  4.042  2.422 0.330 0.665

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT  790 2771 0.29 0.30  844 0.94     *
WB  LT-TH     504 2370 0.21 0.27  631 0.80
NB  LT        478 1580 0.14 0.15  515 0.93     *
NB  TH-RT    2319 5093 0.46 0.49 2479 0.94     *
SB  LT        215 1580 0.11 0.15  302 0.71
SB  TH-RT     896 4820 0.19 0.49 2346 0.38

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.88 TOTAL V/C= 0.93
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  214 ON THE PERMISSIVE PHASE
FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  0 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C    C      d1     c      d2    PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.94 0.30 100.0  25.70   844   12.66 0.85   32.61  D  14.5    21
WB  LT-TH    0.80 0.27 100.0  25.99   631    5.00 0.85   26.34  D   9.8    11
NB  LT       0.93 0.64 100.0  12.29   515   16.60 1.00   28.89  D  11.3    12
NB  TH-RT    0.94 0.49 100.0  18.38  2479    5.54 0.85   20.34  C  30.1    37
SB  LT       0.71 0.64 100.0   9.23   302    5.21 1.00   14.44  B   5.1     5
SB  TH-RT    0.38 0.49 100.0  12.30  2346    0.05 0.85   10.50  B  11.6    12

DIR Delay LOS
EB  32.61  D
WB  26.34  D
NB  21.80  C
SB  11.26  B
INTERSECTION DELAY = 21.63 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  79.4 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is   3.9 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  26.6 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  14.8 secs green,   0.0 secs yellow + red clear
suggested timing phase 4 is  48.7 secs green,   3.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/COLUMBUS/NEW DUDLEY
MASTER PLAN DESIGN - PM PEAK HOUR
date:08-13-1989 time:21:22:57
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I7MPPM GEOMETRICS=P18INT7 SIGNAL=P18INT7
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	274	293	505	0	2	0	0.0	12.0	0.0	50
WB	52	385	0	0	2	0	0.0	12.0	0.0	50
NB	315	984	3	1	3	0	10.0	11.0	0.0	47
SB	224	1448	177	1	3	0	10.0	11.0	0.0	46

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS			ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	200	N	16.5	3
WB	0.0%	2.0%	N	0	0	.950	200	N	16.5	3
NB	0.0%	2.0%	N	0	5	.950	300	N	15.8	3
SB	0.0%	2.0%	N	0	5	.950	200	N	15.8	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*									*				*	9.6	0	A
2	*	*	*		*	*						*				*	32.1	3	A
3				*				*	*				*				16.0	0	A
4				*				*	*	*	*		*	*	*		36.3	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	274	293	505	.950	288	308	532
WB	52	385	0	.950	55	405	0
NB	315	984	3	.950	332	1036	3
SB	224	1448	177	.950	236	1524	186

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	1128	2	1.05	1185	0.26	0.47
WB	LT-TH	460	2	1.05	483	0.12	0.00
NB	LT	332	1	1.00	332	1.00	0.00
NB	TH-RT	1039	3	1.10	1143	0.00	0.00
SB	LT	236	1	1.00	236	1.00	0.00
SB	TH-RT	1711	3	1.10	1882	0.00	0.11

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN BEING OPPOSED	OPPOSING APPROACH VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING VOLUME
	LT	TH	RT	LT	TH	RT	LT	TH	RT	
EASTBOUND	55	405	0	100	100	0	0	2	0	460
WESTBOUND	288	308	532	77	77	77	0	2	0	869
NORTHBOUND	236	1524	186	100	100	100	1	3	0	1399
SOUTHBOUND	332	1036	3	100	100	100	1	3	0	1039

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.862	0.894	2748
WB	LT-TH	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	1.000	0.581	2071
NB	LT	1800	1	0.933	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1580

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NB  TH-RT     1800  3 0.967 0.990 1.000 1.000 0.993 1.000 0.999 1.000 5129
SB  LT        1800  1 0.933 0.990 1.000 1.000 1.000 1.000 1.000 0.950 1580
SB  TH-RT     1800  3 0.967 0.990 1.000 1.000 0.993 1.000 0.973 1.000 4995

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB 100  32  2  460  460   55 0.12  2  869 0.26
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
WB 2918 0.298  3.222 0.332 0.804 28.834 0.196  0.488    3.392 0.162 0.581

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT 1185 2748 0.43 0.42 1143 1.04     *
WB  LT-TH     483 2071 0.23 0.32  664 0.73
NB  LT        332 1580 0.17 0.16  320 1.04     *
NB  TH-RT    1143 5129 0.22 0.36 1864 0.61
SB  LT        236 1580 0.10 0.16  391 0.60
SB  TH-RT    1882 4995 0.38 0.36 1816 1.04     *

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.97 TOTAL V/C= 1.04
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  0 ON THE PERMISSIVE PHASE
FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  71 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c     d2    PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 1.04 0.42 100.0 22.78 1143  30.13 0.85   44.97  E  23.2   43
WB  LT-TH    0.73 0.32 100.0 22.88  664   2.79 0.85   21.82  C   8.7    9
NB  LT       1.04 0.52 100.0 18.83  320  49.33 1.00   68.16  F  10.1   20
NB  TH-RT    0.61 0.36 100.0 19.81 1864   0.44 0.85   17.21  C  18.4   18
SB  LT       0.60 0.52 100.0 12.60  391   1.89 1.00   14.49  B   5.5    5
SB  TH-RT    1.04 0.36 100.0 24.70 1816  25.75 0.85   42.88  E  35.5   62

DIR Delay LOS
EB  44.97  E
WB  21.82  C
NB  28.67  D
SB  39.72  D
INTERSECTION DELAY = 36.16 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/COLUMBUS/NEW DUDLEY
MASTER PLAN DESIGN - SAT PEAK HOUR
date:08-13-1989 time:21:27:28
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I7MPS GEOMETRICS=P18INT7 SIGNAL=P18INT7
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	239	271	262	0	2	0	0.0	12.0	0.0	50
WB	68	278	0	0	2	0	0.0	12.0	0.0	50
NB	295	1124	19	1	3	0	10.0	11.0	0.0	47
SB	211	1070	168	1	3	0	10.0	11.0	0.0	46

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.890	100	N	16.5	3
WB	0.0%	2.0%	N	0	0	.890	100	N	16.5	3
NB	0.0%	2.0%	N	0	5	.890	100	N	15.8	3
SB	0.0%	2.0%	N	0	5	.890	100	N	15.8	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*									*				*	7.3	0	A
2	*	*	*		*	*						*				*	29.4	3	A
3				*				*	*				*				20.7	0	A
4				*				*	*	*	*		*	*	*		36.5	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	239	271	262	.890	269	304	294
WB	68	278	0	.890	76	312	0
NB	295	1124	19	.890	331	1263	21
SB	211	1070	168	.890	237	1202	189

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	867	2	1.05	911	0.31	0.34
WB	LT-TH	389	2	1.05	408	0.20	0.00
NB	LT	331	1	1.00	331	1.00	0.00
NB	TH-RT	1284	3	1.10	1413	0.00	0.02
SB	LT	237	1	1.00	237	1.00	0.00
SB	TH-RT	1391	3	1.10	1530	0.00	0.14

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	76	312	0	100	100	0	0	2	0	389
WESTBOUND	269	304	294	80	80	80	0	2	0	694
NORTHBOUND	237	1202	189	100	100	100	1	3	0	1391
SOUTHBOUND	331	1263	21	100	100	100	1	3	0	1284

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.933	0.890	2959
WB	LT-TH	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	1.000	0.617	2201
NB	LT	1800	1	0.933	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1580

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NB  TH-RT     1800  3 0.967 0.990 1.000 1.000 0.993 1.000 0.997 1.000 5116
SB  LT        1800  1 0.933 0.990 1.000 1.000 1.000 1.000 1.000 0.950 1580
SB  TH-RT     1800  3 0.967 0.990 1.000 1.000 0.993 1.000 0.973 1.000 4995

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB 100  29  2  389  389   76 0.20  2  694 0.31
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf      El    Fm   Flt
WB 2900 0.239  7.150 0.441 0.951 22.220 0.049  0.104   2.549 0.235 0.617

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH-RT  911 2959 0.31 0.37 1086 0.84     *
WB  LT-TH     408 2201 0.19 0.29  646 0.63
NB  LT        331 1580 0.17 0.21  396 0.84     *
NB  TH-RT    1413 5116 0.28 0.37 1869 0.76
SB  LT        237 1580 0.12 0.21  412 0.58
SB  TH-RT    1530 4995 0.31 0.37 1825 0.84     *

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.79 TOTAL V/C= 0.84
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  1 ON THE PERMISSIVE PHASE
FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 67 LEFT TURNS ON THE CHANGE INTERVAL AND  18 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c     d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH-RT 0.84 0.37 100.0 21.99 1086   4.20 0.85  22.26  C  15.2   17
WB  LT-TH    0.63 0.29 100.0 23.27  646   1.42 0.85  20.99  C   7.6    8
NB  LT       0.84 0.57 100.0 13.33  396  10.10 1.00  23.43  C   7.3    7
NB  TH-RT    0.76 0.37 100.0 21.14 1869   1.27 0.85  19.05  C  22.6   23
SB  LT       0.58 0.57 100.0 10.34  412   1.46 1.00  11.80  B   5.2    5
SB  TH-RT    0.84 0.37 100.0 22.06 1825   2.59 0.85  20.96  C  24.5   25

DIR Delay LOS
EB  22.26  C
WB  20.99  C
NB  19.89  C
SB  19.73  C
INTERSECTION DELAY = 20.37 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  35.2 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is   7.3 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  29.4 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  20.7 secs green,   0.0 secs yellow + red clear
suggested timing phase 4 is  36.5 secs green,   3.0 secs yellow + red clear

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
PARKER/RUGGLES
MASTER PLAN DESIGN (W/NO BUILD IMPROVEMENTS) - AM PEAK HOUR
date:08-13-1989 time:23:01:41
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I8MPAM GEOMETRICS=P18INT8M SIGNAL=P18INT8M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	21	734	106	0	2	0	0.0	11.0	0.0	48
WB	57	713	104	0	2	0	0.0	11.0	0.0	48
NB	128	264	25	0	1	0	0.0	12.0	0.0	20
SB	132	241	40	0	1	0	0.0	11.0	0.0	20

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.930	100	N	16.0	3
WB	0.0%	2.0%	N	0	0	.930	100	N	16.0	3
NB	0.0%	2.0%	N	10	0	.930	100	N	9.0	3
SB	0.0%	2.0%	Y	0	0	.930	100	N	9.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*	*	*	*		*	*	*		47.1	3	A
2	*	*	*		*	*	*					*				*	46.9	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	21	734	106	.930	23	789	114
WB	57	713	104	.930	61	767	112
NB	128	264	25	.930	138	284	27
SB	132	241	40	.930	142	259	43

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	926	2	1.05	972	0.02	0.12
WB	LT-TH-RT	940	2	1.05	987	0.07	0.12
NB	LT-TH-RT	448	1	1.00	448	0.31	0.06
SB	LT-TH-RT	444	1	1.00	444	0.32	0.10

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	61	767	112	100	100	100	0	2	0	940
WESTBOUND	23	789	114	100	100	100	0	2	0	926
NORTHBOUND	142	259	43	100	100	100	0	1	0	302
SOUTHBOUND	138	284	27	100	100	100	0	1	0	311

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	0.976	0.822	2763
WB	LT-TH-RT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	0.976	0.726	2443
NB	LT-TH-RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.889	0.740	1173
SB	LT-TH-RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.882	0.726	1103

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	100	47	2	926	926	23	0.02	2	940	0.07
WB	100	47	2	940	940	61	0.07	2	926	0.02
NB	100	47	1	448	311	138	0.31	1	302	0.32
SB	100	47	1	444	302	142	0.32	1	311	0.31

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	3045	0.309	23.184	0.288	0.127	23.709	0.873	11.013	3.911	0.644	0.822
WB	3361	0.275	26.706	0.296	0.312	20.187	0.688	4.317	3.796	0.452	0.726
NB	1489	0.203	33.645	0.686	0.307	13.461	0.693	4.133	1.640	0.740	0.740
SB	1505	0.207	33.339	0.681	0.320	13.768	0.680	3.957	1.653	0.726	0.726

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH-RT	972	2763	0.35	0.47	1296	0.75	
WB	LT-TH-RT	987	2443	0.40	0.47	1146	0.86	*
NB	LT-TH-RT	448	1173	0.38	0.47	553	0.81	
SB	LT-TH-RT	444	1103	0.40	0.47	520	0.85	*

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.81 TOTAL V/C= 0.86

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH-RT	0.75	0.47	100.0	16.53	1296	1.74	0.85	15.53	C	13.7	14
WB	LT-TH-RT	0.86	0.47	100.0	17.98	1146	4.89	0.85	19.44	C	13.9	16
NB	LT-TH-RT	0.81	0.47	100.0	17.21	553	6.21	0.85	19.91	C	6.6	8
SB	LT-TH-RT	0.85	0.47	100.0	17.80	520	9.16	0.85	22.92	C	6.5	9

DIR	Delay	LOS
EB	15.53	C
WB	19.44	C
NB	19.91	C
SB	22.92	C

INTERSECTION DELAY = 18.72 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 39.7 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 46.9 secs green, 3.0 secs yellow + red clear
suggested timing phase 2 is 47.1 secs green, 3.0 secs yellow + red clear

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
PARKER/RUGGLES
MASTER PLAN DESIGN (W/NO BUILD IMPROVEMENTS) - PM PEAK HOUR
date:08-13-1989 time:23:13:56
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I8MPPM GEOMETRICS=P18INT8M SIGNAL=P18INT8M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	32	874	115	0	2	0	0.0	11.0	0.0	48
WB	34	1000	103	0	2	0	0.0	11.0	0.0	48
NB	99	182	33	0	1	0	0.0	12.0	0.0	20
SB	168	269	28	0	1	0	0.0	11.0	0.0	20

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.970	100	N	16.0	3
WB	0.0%	2.0%	N	0	0	.970	100	N	16.0	3
NB	0.0%	2.0%	N	10	0	.970	100	N	9.0	3
SB	0.0%	2.0%	Y	0	0	.970	100	N	9.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*	*	*	*		*	*	*		42.2	3	A
2	*	*	*		*	*	*					*				*	51.8	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	32	874	115	.970	33	901	119
WB	34	1000	103	.970	35	1031	106
NB	99	182	33	.970	102	188	34
SB	168	269	28	.970	173	277	29

THE LIBRARY
BOSTON REDEVELOPMENT AUTHORITY
City Hall - Room 912
Boston, Mass. 02201

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	1053	2	1.05	1105	0.03	0.11
WB	LT-TH-RT	1172	2	1.05	1231	0.03	0.09
NB	LT-TH-RT	324	1	1.00	324	0.32	0.11
SB	LT-TH-RT	479	1	1.00	479	0.36	0.06

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	35	1031	106	100	100	100	0	2	0	1172
WESTBOUND	33	901	119	100	100	100	0	2	0	1053
NORTHBOUND	173	277	29	100	100	100	0	1	0	306
SOUTHBOUND	102	188	34	100	100	100	0	1	0	222

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	0.978	0.672	2266
WB	LT-TH-RT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	0.982	0.739	2502
NB	LT-TH-RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.881	0.701	1100
SB	LT-TH-RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.889	0.779	1193

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	100	52	2	1053	1053	33	0.03	2	1172	0.03
WB	100	52	2	1172	1172	35	0.03	2	1053	0.03
NB	100	42	1	324	222	102	0.32	1	306	0.36
SB	100	42	1	479	306	173	0.36	1	222	0.32

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	3200	0.366	23.948	0.142	0.237	27.859	0.763	6.303	7.900	0.345	0.672
WB	2960	0.356	25.210	0.217	0.185	26.597	0.815	8.221	5.181	0.479	0.739
NB	1512	0.203	27.513	0.684	0.315	14.680	0.685	4.074	1.646	0.701	0.701
SB	1496	0.148	32.136	0.736	0.361	10.058	0.639	3.165	1.528	0.779	0.779

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH-RT	1105	2266	0.49	0.52	1174	0.94	
WB	LT-TH-RT	1231	2502	0.49	0.52	1296	0.95	*
NB	LT-TH-RT	324	1100	0.29	0.42	464	0.70	
SB	LT-TH-RT	479	1193	0.40	0.42	504	0.95	*

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.89 TOTAL V/C= 0.95

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH-RT	0.94	0.52	100.0	17.23	1174	10.60	0.85	23.66	C	14.1	22
WB	LT-TH-RT	0.95	0.52	100.0	17.37	1296	10.77	0.85	23.92	C	15.7	24
NB	LT-TH-RT	0.70	0.42	100.0	17.99	464	3.15	0.85	17.97	C	5.2	6
SB	LT-TH-RT	0.95	0.42	100.0	21.22	504	20.76	0.85	35.69	D	8.6	15

DIR	Delay	LOS
EB	23.66	C
WB	23.92	C
NB	17.97	C
SB	35.69	D

INTERSECTION DELAY = 25.01 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 101.1 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 42.3 secs green, 3.0 secs yellow + red clear
suggested timing phase 2 is 51.7 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
PARKER/RUGGLES
MASTER PLAN DESIGN (W/NO BUILD IMPROVEMENTS) - SAT PEAK HOUR
date:08-13-1989 time:23:21:43
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I8MPS GEOMETRICS=P18INT8M SIGNAL=P18INT8M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	7	522	35	0	2	0	0.0	11.0	0.0	48
WB	25	553	107	0	2	0	0.0	11.0	0.0	48
NB	45	118	36	0	1	0	0.0	12.0	0.0	20
SB	141	224	14	0	1	0	0.0	11.0	0.0	20

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.880	50	N	16.0	3
WB	0.0%	2.0%	N	0	0	.880	50	N	16.0	3
NB	0.0%	2.0%	N	10	0	.880	50	N	9.0	3
SB	0.0%	2.0%	Y	0	0	.880	50	N	9.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1				*				*	*	*	*		*	*	*		52.0	3	A
2	*	*	*		*	*	*					*				*	42.0	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	7	522	35	.880	8	593	40
WB	25	553	107	.880	28	628	122
NB	45	118	36	.880	51	134	41
SB	141	224	14	.880	160	255	16

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH-RT	641	2	1.05	673	0.01	0.06
WB	LT-TH-RT	778	2	1.05	817	0.04	0.16
NB	LT-TH-RT	226	1	1.00	226	0.23	0.18
SB	LT-TH-RT	431	1	1.00	431	0.37	0.04

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	28	628	122	100	100	100	0	2	0	778
WESTBOUND	8	593	40	100	100	100	0	2	0	641
NORTHBOUND	160	255	16	100	100	100	0	1	0	270
SOUTHBOUND	51	134	41	100	100	100	0	1	0	175

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH-RT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	0.989	0.958	3264
WB	LT-TH-RT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	0.973	0.922	3090
NB	LT-TH-RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.871	0.851	1321
SB	LT-TH-RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.894	0.855	1318

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
EB	100	42	2	641	641	8	0.01	2	778	0.04
WB	100	42	2	778	778	28	0.04	2	641	0.01
NB	100	52	1	226	175	51	0.23	1	270	0.37
SB	100	52	1	431	270	160	0.37	1	175	0.23

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
EB	3428	0.227	25.009	0.388	0.049	17.026	0.951	13.501	2.896	0.915	0.958
WB	3517	0.182	29.120	0.474	0.120	12.916	0.880	8.235	2.371	0.844	0.922
NB	1532	0.176	41.669	0.706	0.226	10.295	0.774	5.015	1.594	0.851	0.851
SB	1587	0.110	46.011	0.766	0.372	5.953	0.628	2.531	1.469	0.855	0.855

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH-RT	673	3264	0.21	0.42	1372	0.49	
WB	LT-TH-RT	817	3090	0.26	0.42	1299	0.63	*
NB	LT-TH-RT	226	1321	0.17	0.52	686	0.33	
SB	LT-TH-RT	431	1318	0.33	0.52	685	0.63	*

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.59 TOTAL V/C= 0.63

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH-RT	0.49	0.42	100.0	16.08	1372	0.23	0.85	13.87	B	10.3	10
WB	LT-TH-RT	0.63	0.42	100.0	17.36	1299	0.71	0.85	15.35	C	12.5	13
NB	LT-TH-RT	0.33	0.52	100.0	10.58	686	0.11	0.85	9.08	B	3.0	3
SB	LT-TH-RT	0.63	0.52	100.0	13.03	685	1.32	0.85	12.20	B	5.7	6

DIR	Delay	LOS
EB	13.87	B
WB	15.35	C
NB	9.08	B
SB	12.20	B

INTERSECTION DELAY = 13.59 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 15.9 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
COLUMBUS/MELNEA CASS/BUS DRIVE
MASTER PLAN DESIGN (NO TREMONT ACCESS) - AM PEAK HOUR
date:08-18-1989 time:10:17:51
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I9MPNAM GEOMETRICS=P18I9 SIGNAL=P18I9
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	2	0	0	1	0	0.0	15.0	0.0	32
WB	397	21	760	0	1	1	0.0	12.0	12.0	26
NB	0	18	100	0	1	1	0.0	12.0	12.0	26
SB	0	286	50	0	2	0	0.0	12.0	0.0	52

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	%100.0%	N	0	0	.950	100	N	12.0	3
WB	0.0%	15.0%	N	0	0	.950	50	N	12.0	4
NB	0.0%	2.0%	N	10	0	.950	100	N	17.0	3
SB	0.0%	2.0%	Y	0	0	.950	100	N	17.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1							*					*		*	*		20.8	3	A
2			*					*		*	*						10.2	3	A
3	*	*	*		*	*	*					*				*	60.0	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	2	0	.950	0	2	0
WB	397	21	760	.950	418	22	800
NB	0	18	100	.950	0	19	105
SB	0	286	50	.950	0	301	53

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	2	1	1.00	2	0.00	0.00
WB	LT-TH	440	1	1.00	440	0.95	0.00
WB	RT	800	1	1.00	800	0.00	1.00
NB	TH	19	1	1.00	19	0.00	0.00
NB	RT	105	1	1.00	105	0.00	1.00
SB	TH-RT	354	2	1.05	371	0.00	0.15

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	2	0	100	100	100	0	1	0	2

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	1	1.100	0.667	1.000	1.000	1.000	1.000	1.000	1.000	1320
WB	LT-TH	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	1.000	0.850	1423
WB	RT	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	0.815	1.000	1364
NB	TH	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	1782
NB	RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.826	1.000	1472
SB	TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.978	1.000	3485

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
WB	100	60	1	440	822	418	0.95	1	2	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
WB	1800	0.001	59.975	0.874	0.950	0.047	0.050	0.007	1.288	0.850	0.850

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	2	1320	0.00	0.60	792	0.00	
WB	LT-TH	440	1423	0.31	0.60	854	0.52	
WB	RT	800	1364	0.59	0.84	1143	0.70	*
NB	TH	19	1782	0.01	0.10	182	0.10	
NB	RT	105	1472	0.07	0.10	151	0.70	*
SB	TH-RT	371	3485	0.11	0.21	723	0.51	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.66 TOTAL V/C= 0.70

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.00	0.60	100.0	6.08	792	0.00	0.85	5.17	B	0.0	1
WB	LT-TH	0.52	0.60	100.0	8.79	854	0.45	0.62	5.73	B	4.9	5
WB	RT	0.70	0.84	100.0	2.42	1143	1.35	0.67	2.52	A	3.6	4
NB	TH	0.10	0.10	100.0	30.95	182	0.01	0.85	26.32	D	0.5	1
NB	RT	0.70	0.10	100.0	32.98	151	8.88	0.85	35.58	D	2.6	4
SB	TH-RT	0.51	0.21	100.0	26.71	723	0.53	0.85	23.15	C	7.8	8

DIR	Delay	LOS
EB	5.17	B
WB	3.66	A
NB	34.17	D
SB	23.15	C

INTERSECTION DELAY = 10.01 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 19.5 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 20.7 secs green, 3.0 secs yellow + red clear
suggested timing phase 2 is 10.2 secs green, 3.0 secs yellow + red clear
suggested timing phase 3 is 60.1 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
COLUMBUS/MELNEA CASS/BUS DRIVE
MASTER PLAN DESIGN (NO TREMONT ACCESS) - PM PEAK HOUR
date:08-18-1989 time:10:29:40
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I9MPNPM GEOMETRICS=P18I9 SIGNAL=P18I9
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	1	0	0	1	0	0.0	15.0	0.0	32
WB	152	24	298	0	1	1	0.0	12.0	12.0	26
NB	0	51	393	0	1	1	0.0	12.0	12.0	26
SB	0	783	49	0	2	0	0.0	12.0	0.0	52

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN	TIME	TYPE
EB	0.0%	%100.0%	N	0	0	.930	100	N		12.0	3
WB	0.0%	15.0%	N	0	0	.930	50	N	12.0		4
NB	0.0%	2.0%	N	10	0	.930	100	N	17.0		3
SB	0.0%	2.0%	Y	0	0	.930	100	N	17.0		3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1							*					*		*	*		36.3	3	A
2				*				*		*	*						39.2	3	A
3	*	*	*		*	*	*					*				*	15.4	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	1	0	.930	0	1	0
WB	152	24	298	.930	163	26	320
NB	0	51	393	.930	0	55	423
SB	0	783	49	.930	0	842	53

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	1	1	1.00	1	0.00	0.00
WB	LT-TH	189	1	1.00	189	0.86	0.00
WB	RT	320	1	1.00	320	0.00	1.00
NB	TH	55	1	1.00	55	0.00	0.00
NB	RT	423	1	1.00	423	0.00	1.00
SB	TH-RT	895	2	1.05	939	0.00	0.06

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	1	0	100	100	100	0	1	0	1

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	1	1.100	0.667	1.000	1.000	1.000	1.000	1.000	1.000	1320
WB	LT-TH	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	1.000	1.000	1674
WB	RT	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	0.836	1.000	1399
NB	TH	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	1782
NB	RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.826	1.000	1472
SB	TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.991	1.000	3533

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
WB	100	15	1	189	346	163	0.86	1	1	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
WB	1800	0.001	15.395	0.874	0.864	0.051	0.136	0.016	1.287	1.000	1.000

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	1	1320	0.00	0.15	204	0.01	
WB	LT-TH	189	1674	0.11	0.15	259	0.73	*
WB	RT	320	1399	0.23	0.55	767	0.42	
NB	TH	55	1782	0.03	0.39	699	0.08	
NB	RT	423	1472	0.29	0.39	577	0.73	*
SB	TH-RT	939	3533	0.27	0.36	1284	0.73	*

CYCLE=100.0 LOST= 9.0 SUM V/S CRIT= 0.67 TOTAL V/C= 0.73

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.01	0.15	100.0	27.19	204	0.00	0.85	23.11	C	0.0	1
WB	LT-TH	0.73	0.15	100.0	30.63	259	6.87	0.68	25.60	D	4.4	5
WB	RT	0.42	0.55	100.0	10.08	767	0.23	0.62	6.39	B	4.0	4
NB	TH	0.08	0.39	100.0	14.48	699	0.00	0.85	12.31	B	0.9	1
NB	RT	0.73	0.39	100.0	19.69	577	3.28	0.85	19.53	C	7.1	8
SB	TH-RT	0.73	0.36	100.0	20.98	1284	1.53	0.85	19.13	C	15.8	16

DIR	Delay	LOS
EB	23.11	C
WB	13.52	B
NB	18.70	C
SB	19.13	C

INTERSECTION DELAY = 17.54 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 30.1 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
COLUMBUS/MELNEA CASS/BUS DRIVE
MASTER PLAN DESIGN (NO TREMONT ACCESS) - SAT PEAK HOUR
date:08-18-1989 time:10:58:22
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I9MPNS GEOMETRICS=P18I9 SIGNAL=P18I9
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	1	0	0	1	0	0.0	15.0	0.0	32
WB	136	8	287	0	1	1	0.0	12.0	12.0	26
NB	0	19	161	0	1	1	0.0	12.0	12.0	26
SB	0	410	68	0	2	0	0.0	12.0	0.0	52

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN	TIME	TYPE
EB	0.0%	%100.0%	N	0	0	.950	100	N	12.0		3
WB	0.0%	15.0%	N	0	0	.950	50	N	12.0		4
NB	0.0%	2.0%	N	10	0	.950	100	N	17.0		3
SB	0.0%	2.0%	Y	0	0	.950	100	N	17.0		3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1							*					*		*	*		38.1	3	A
2				*				*		*	*						29.0	3	A
3	*	*	*		*	*	*					*				*	23.9	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	1	0	.950	0	1	0
WB	136	8	287	.950	143	8	302
NB	0	19	161	.950	0	20	169
SB	0	410	68	.950	0	432	72

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	1	1	1.00	1	0.00	0.00
WB	LT-TH	152	1	1.00	152	0.94	0.00
WB	RT	302	1	1.00	302	0.00	1.00
NB	TH	20	1	1.00	20	0.00	0.00
NB	RT	169	1	1.00	169	0.00	1.00
SB	TH-RT	503	2	1.05	528	0.00	0.14

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									OPPOSING
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			VOLUME
	LT	TH	RT	LT	TH	RT	LT	TH	RT	
WESTBOUND	0	1	0	100	100	100	0	1	0	1

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	1	1.100	0.667	1.000	1.000	1.000	1.000	1.000	1.000	1320
WB	LT-TH	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	1.000	0.948	1588
WB	RT	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	0.832	1.000	1392
NB	TH	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	1782
NB	RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.826	1.000	1472
SB	TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.979	1.000	3488

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
WB	100	24	1	152	311	143	0.94	1	1	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
WB	1800	0.001	23.886	0.874	0.944	0.045	0.056	0.007	1.287	0.948	0.948

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	1	1320	0.00	0.24	316	0.00	
WB	LT-TH	152	1588	0.10	0.24	380	0.40	*
WB	RT	302	1392	0.22	0.65	906	0.33	
NB	TH	20	1782	0.01	0.29	516	0.04	
NB	RT	169	1472	0.12	0.29	426	0.40	*
SB	TH-RT	528	3488	0.15	0.38	1329	0.40	*

CYCLE=100.0 LOST= 9.0 SUM V/S CRIT= 0.36 TOTAL V/C= 0.40

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.00	0.24	100.0	22.01	316	0.00	0.85	18.71	C	0.0	1
WB	LT-TH	0.40	0.24	100.0	24.31	380	0.38	0.62	15.31	C	3.2	3
WB	RT	0.33	0.65	100.0	5.93	906	0.08	0.62	3.73	A	2.9	3
NB	TH	0.04	0.29	100.0	19.39	516	0.00	0.85	16.49	C	0.4	1
NB	RT	0.40	0.29	100.0	21.67	426	0.33	0.85	18.70	C	3.3	3
SB	TH-RT	0.40	0.38	100.0	17.15	1329	0.11	0.85	14.67	B	8.7	9

DIR	Delay	LOS
EB	18.71	C
WB	7.60	B
NB	18.47	C
SB	14.67	B

INTERSECTION DELAY = 12.55 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 14.5 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 38.1 secs green, 3.0 secs yellow + red clear
suggested timing phase 2 is 28.9 secs green, 3.0 secs yellow + red clear
suggested timing phase 3 is 24.0 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
COLUMBUS/MELNEA CASS/BUS DRIVE
MASTER PLAN DESIGN (TREMONT RGT IN/OUT) - AM PEAK HOUR
date:08-18-1989 time:10:52:33
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I9MPRAM GEOMETRICS=P18I9 SIGNAL=P18I9
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	2	0	0	1	0	0.0	15.0	0.0	32
WB	340	21	760	0	1	1	0.0	12.0	12.0	26
NB	0	18	64	0	1	1	0.0	12.0	12.0	26
SB	0	286	110	0	2	0	0.0	12.0	0.0	52

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	%100.0%	N	0	0	.950	100	N	12.0	3
WB	0.0%	15.0%	N	0	0	.950	50	N	12.0	4
NB	0.0%	2.0%	N	10	0	.950	100	N	17.0	3
SB	0.0%	2.0%	Y	0	0	.950	100	N	17.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1							*					*		*	*		27.5	3	A
2				*				*		*	*						6.8	3	A
3	*	*	*		*	*	*					*				*	56.7	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	2	0	.950	0	2	0
WB	340	21	760	.950	358	22	800
NB	0	18	64	.950	0	19	67
SB	0	286	110	.950	0	301	116

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	2	1	1.00	2	0.00	0.00
WB	LT-TH	380	1	1.00	380	0.94	0.00
WB	RT	800	1	1.00	800	0.00	1.00
NB	TH	19	1	1.00	19	0.00	0.00
NB	RT	67	1	1.00	67	0.00	1.00
SB	TH-RT	417	2	1.05	438	0.00	0.28

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	2	0	100	100	100	0	1	0	2

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	1	1.100	0.667	1.000	1.000	1.000	1.000	1.000	1.000	1320
WB	LT-TH	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	1.000	0.855	1431
WB	RT	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	0.818	1.000	1370
NB	TH	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	1782
NB	RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.826	1.000	1472
SB	TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.958	1.000	3416

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
WB	100	57	1	380	822	358	0.94	1	2	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
WB	1800	0.001	56.646	0.874	0.942	0.051	0.058	0.009	1.288	0.855	0.855

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	2	1320	0.00	0.57	748	0.00	
WB	LT-TH	380	1431	0.27	0.57	811	0.47	
WB	RT	800	1370	0.58	0.87	1194	0.67	*
NB	TH	19	1782	0.01	0.07	122	0.16	
NB	RT	67	1472	0.05	0.07	101	0.67	*
SB	TH-RT	438	3416	0.13	0.27	938	0.47	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.63 TOTAL V/C= 0.67

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.00	0.57	100.0	7.14	748	0.00	0.85	6.07	B	0.0	1
WB	LT-TH	0.47	0.57	100.0	9.70	811	0.33	0.62	6.22	B	4.6	5
WB	RT	0.67	0.87	100.0	1.51	1194	1.04	0.65	1.67	A	2.9	3
NB	TH	0.16	0.07	100.0	33.33	122	0.05	0.85	28.38	D	0.5	1
NB	RT	0.67	0.07	100.0	34.56	101	10.35	0.85	38.17	D	1.7	3
SB	TH-RT	0.47	0.27	100.0	22.93	938	0.28	0.85	19.73	C	8.4	8

DIR	Delay	LOS
EB	6.07	B
WB	3.13	A
NB	36.02	D
SB	19.73	C

INTERSECTION DELAY = 9.06 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 17.8 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 27.4 secs green, 3.0 secs yellow + red clear
suggested timing phase 2 is 6.8 secs green, 3.0 secs yellow + red clear
suggested timing phase 3 is 56.8 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
COLUMBUS/MELNEA CASS/BUS DRIVE
MASTER PLAN DESIGN (TREMOUT RGT IN/OUT) - PM PEAK HOUR
date:08-18-1989 time:11:05:21
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I9MPRPM GEOMETRICS=P18I9 SIGNAL=P18I9
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	1	0	0	1	0	0.0	15.0	0.0	32
WB	132	24	298	0	1	1	0.0	12.0	12.0	26
NB	0	51	255	0	1	1	0.0	12.0	12.0	26
SB	0	643	185	0	2	0	0.0	12.0	0.0	52

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	%100.0%	N	0	0	.930	100	N	12.0	3
WB	0.0%	15.0%	N	0	0	.930	50	N	12.0	4
NB	0.0%	2.0%	N	10	0	.930	100	N	17.0	3
SB	0.0%	2.0%	Y	0	0	.930	100	N	17.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1							*					*		*	*		44.3	3	A
2			*					*		*	*						30.4	3	A
3	*	*	*		*	*	*					*				*	16.3	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	1	0	.930	0	1	0
WB	132	24	298	.930	142	26	320
NB	0	51	255	.930	0	55	274
SB	0	643	185	.930	0	691	199

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	1	1	1.00	1	0.00	0.00
WB	LT-TH	168	1	1.00	168	0.85	0.00
WB	RT	320	1	1.00	320	0.00	1.00
NB	TH	55	1	1.00	55	0.00	0.00
NB	RT	274	1	1.00	274	0.00	1.00
SB	TH-RT	890	2	1.05	935	0.00	0.22

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	1	0	100	100	100	0	1	0	1

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	1	1.100	0.667	1.000	1.000	1.000	1.000	1.000	1.000	1320
WB	LT-TH	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	1.000	1.000	1674
WB	RT	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	0.837	1.000	1402
NB	TH	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	1782
NB	RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.826	1.000	1472
SB	TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.966	1.000	3445

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
WB	100	16	1	168	346	142	0.85	1	1	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
WB	1800	0.001	16.294	0.874	0.846	0.050	0.154	0.017	1.287	1.000	1.000

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	1	1320	0.00	0.16	216	0.00	
WB	LT-TH	168	1674	0.10	0.16	274	0.61	*
WB	RT	320	1402	0.23	0.64	892	0.36	
NB	TH	55	1782	0.03	0.30	541	0.10	
NB	RT	274	1472	0.19	0.30	447	0.61	*
SB	TH-RT	935	3445	0.27	0.44	1525	0.61	*

CYCLE=100.0 LOST= 9.0 SUM V/S CRIT= 0.56 TOTAL V/C= 0.61

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.00	0.16	100.0	26.62	216	0.00	0.85	22.62	C	0.0	1
WB	LT-TH	0.61	0.16	100.0	29.55	274	2.85	0.63	20.30	C	3.9	4
WB	RT	0.36	0.64	100.0	6.52	892	0.11	0.62	4.11	A	3.2	3
NB	TH	0.10	0.30	100.0	19.00	541	0.00	0.85	16.15	C	1.1	1
NB	RT	0.61	0.30	100.0	22.63	447	1.78	0.85	20.75	C	5.3	6
SB	TH-RT	0.61	0.44	100.0	16.20	1525	0.53	0.85	14.22	B	13.8	14

DIR	Delay	LOS
EB	22.62	C
WB	9.67	B
NB	19.98	C
SB	14.22	B

INTERSECTION DELAY = 14.04 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 21.8 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
COLUMBUS/MELNEA CASS/BUS DRIVE
MASTER PLAN DESIGN (TREMONT RGT IN/OUT) - SAT PEAK HOUR
date:08-18-1989 time:11:13:12
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I9MPRS GEOMETRICS=P18I9 SIGNAL=P18I9
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	1	0	0	1	0	0.0	15.0	0.0	32
WB	118	8	287	0	1	1	0.0	12.0	12.0	26
NB	0	19	121	0	1	1	0.0	12.0	12.0	26
SB	0	328	150	0	2	0	0.0	12.0	0.0	52

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	%100.0%	N	0	0	.950	100	N	12.0	3
WB	0.0%	15.0%	N	0	0	.950	50	N	12.0	4
NB	0.0%	2.0%	N	10	0	.950	100	N	17.0	3
SB	0.0%	2.0%	Y	0	0	.950	100	N	17.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1							*					*		*	*		43.6	3	A
2			*					*		*	*						24.2	3	A
3	*	*	*		*	*	*					*				*	23.2	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	1	0	.950	0	1	0
WB	118	8	287	.950	124	8	302
NB	0	19	121	.950	0	20	127
SB	0	328	150	.950	0	345	158

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	1	1	1.00	1	0.00	0.00
WB	LT-TH	133	1	1.00	133	0.94	0.00
WB	RT	302	1	1.00	302	0.00	1.00
NB	TH	20	1	1.00	20	0.00	0.00
NB	RT	127	1	1.00	127	0.00	1.00
SB	TH-RT	503	2	1.05	528	0.00	0.31

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	1	0	100	100	100	0	1	0	1

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	1	1.100	0.667	1.000	1.000	1.000	1.000	1.000	1.000	1320
WB	LT-TH	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	1.000	0.954	1598
WB	RT	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	0.833	1.000	1396
NB	TH	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	1782
NB	RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.826	1.000	1472
SB	TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.953	1.000	3397

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
WB	100	23	1	133	311	124	0.94	1	1	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
WB	1800	0.001	23.138	0.874	0.937	0.045	0.063	0.008	1.287	0.954	0.954

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	1	1320	0.00	0.23	306	0.00	
WB	LT-TH	133	1598	0.08	0.23	370	0.36	*
WB	RT	302	1396	0.22	0.70	974	0.31	
NB	TH	20	1782	0.01	0.24	432	0.05	
NB	RT	127	1472	0.09	0.24	357	0.36	*
SB	TH-RT	528	3397	0.16	0.44	1480	0.36	*

CYCLE=100.0 LOST= 9.0 SUM V/S CRIT= 0.33 TOTAL V/C= 0.36

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.00	0.23	100.0	22.44	306	0.00	0.85	19.07	C	0.0	1
WB	LT-TH	0.36	0.23	100.0	24.45	370	0.26	0.62	15.33	C	2.8	3
WB	RT	0.31	0.70	100.0	4.43	974	0.06	0.62	2.79	A	2.5	3
NB	TH	0.05	0.24	100.0	22.06	432	0.00	0.85	18.75	C	0.4	1
NB	RT	0.36	0.24	100.0	23.88	357	0.27	0.85	20.53	C	2.7	3
SB	TH-RT	0.36	0.44	100.0	14.32	1480	0.07	0.85	12.23	B	7.9	8

DIR	Delay	LOS
EB	19.07	C
WB	6.61	B
NB	20.29	C
SB	12.23	B

INTERSECTION DELAY = 11.11 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 13.7 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 43.5 secs green, 3.0 secs yellow + red clear
suggested timing phase 2 is 24.2 secs green, 3.0 secs yellow + red clear
suggested timing phase 3 is 23.2 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
COLUMBUS/MELNEA CASS/BUS DRIVE
MASTER PLAN DESIGN (W/TREMONT ACCESS) - AM PEAK HOUR
date:08-18-1989 time:11:20:10
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I9MPTAM GEOMETRICS=P18I9 SIGNAL=P18I9
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	2	0	0	1	0	0.0	15.0	0.0	32
WB	198	21	702	0	1	1	0.0	12.0	12.0	26
NB	0	76	64	0	1	1	0.0	12.0	12.0	26
SB	0	286	110	0	2	0	0.0	12.0	0.0	52

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	%100.0%	N	0	0	.950	100	N	12.0	3
WB	0.0%	15.0%	N	0	0	.950	50	N	12.0	4
NB	0.0%	2.0%	N	10	0	.950	100	N	17.0	3
SB	0.0%	2.0%	Y	0	0	.950	100	N	17.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1							*					*		*	*		37.6	3	A
2				*				*		*	*						7.4	3	A
3	*	*	*		*	*	*					*				*	46.0	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	2	0	.950	0	2	0
WB	198	21	702	.950	208	22	739
NB	0	76	64	.950	0	80	67
SB	0	286	110	.950	0	301	116

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	2	1	1.00	2	0.00	0.00
WB	LT-TH	231	1	1.00	231	0.90	0.00
WB	RT	739	1	1.00	739	0.00	1.00
NB	TH	80	1	1.00	80	0.00	0.00
NB	RT	67	1	1.00	67	0.00	1.00
SB	TH-RT	417	2	1.05	438	0.00	0.28

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	2	0	100	100	100	0	1	0	2

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	1	1.100	0.667	1.000	1.000	1.000	1.000	1.000	1.000	1320
WB	LT-TH	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	1.000	0.876	1466
WB	RT	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	0.824	1.000	1379
NB	TH	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	1782
NB	RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.826	1.000	1472
SB	TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.958	1.000	3416

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
WB	100	46	1	231	761	208	0.90	1	2	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
WB	1800	0.001	45.891	0.874	0.904	0.063	0.096	0.015	1.288	0.876	0.876

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	2	1320	0.00	0.46	607	0.00	
WB	LT-TH	231	1466	0.16	0.46	674	0.34	
WB	RT	739	1379	0.54	0.87	1194	0.62	*
NB	TH	80	1782	0.04	0.07	132	0.61	
NB	RT	67	1472	0.05	0.07	109	0.62	*
SB	TH-RT	438	3416	0.13	0.38	1286	0.34	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.58 TOTAL V/C= 0.62

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.00	0.46	100.0	11.12	607	0.00	0.85	9.45	B	0.0	1
WB	LT-TH	0.34	0.46	100.0	13.17	674	0.12	0.62	8.24	B	3.5	3
WB	RT	0.62	0.87	100.0	1.47	1194	0.71	0.63	1.37	A	2.8	3
NB	TH	0.61	0.07	100.0	34.11	132	5.35	0.85	33.54	D	2.1	3
NB	RT	0.62	0.07	100.0	34.14	109	6.88	0.85	34.87	D	1.7	3
SB	TH-RT	0.34	0.38	100.0	16.95	1286	0.06	0.85	14.46	B	7.2	7

DIR	Delay	LOS
EB	9.45	B
WB	3.01	A
NB	34.15	D
SB	14.46	B

INTERSECTION DELAY = 9.18 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 15.5 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 37.5 secs green, 3.0 secs yellow + red clear
suggested timing phase 2 is 7.4 secs green, 3.0 secs yellow + red clear
suggested timing phase 3 is 46.1 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
COLUMBUS/MELNEA CASS/BUS DRIVE
MASTER PLAN DERIGN (W/TREMOUT ACCESS) - PM PEAK HOUR
date:08-18-1989 time:11:25:13
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I9MPTPM GEOMETRICS=P18I9 SIGNAL=P18I9
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	1	0	0	1	0	0.0	15.0	0.0	32
WB	84	24	260	0	1	1	0.0	12.0	12.0	26
NB	0	89	255	0	1	1	0.0	12.0	12.0	26
SB	0	643	185	0	2	0	0.0	12.0	0.0	52

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	%100.0%	N	0	0	.930	100	N	12.0	3
WB	0.0%	15.0%	N	0	0	.930	50	N	12.0	4
NB	0.0%	2.0%	N	10	0	.930	100	N	17.0	3
SB	0.0%	2.0%	Y	0	0	.930	100	N	17.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1							*					*		*	*		46.9	3	A
2			*					*		*	*						32.2	3	A
3	*	*	*		*	*	*					*				*	12.0	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	1	0	.930	0	1	0
WB	84	24	260	.930	90	26	280
NB	0	89	255	.930	0	96	274
SB	0	643	185	.930	0	691	199

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	1	1	1.00	1	0.00	0.00
WB	LT-TH	116	1	1.00	116	0.78	0.00
WB	RT	280	1	1.00	280	0.00	1.00
NB	TH	96	1	1.00	96	0.00	0.00
NB	RT	274	1	1.00	274	0.00	1.00
SB	TH-RT	890	2	1.05	935	0.00	0.22

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	1	0	100	100	100	0	1	0	1

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	1	1.100	0.667	1.000	1.000	1.000	1.000	1.000	1.000	1320
WB	LT-TH	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	1.000	1.000	1674
WB	RT	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	0.840	1.000	1407
NB	TH	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	1782
NB	RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.826	1.000	1472
SB	TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.966	1.000	3445

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
WB	100	12	1	116	305	90	0.78	1	1	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
WB	1800	0.001	11.925	0.874	0.778	0.053	0.222	0.022	1.287	1.000	1.000

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	1	1320	0.00	0.12	158	0.01	
WB	LT-TH	116	1674	0.07	0.12	201	0.58	*
WB	RT	280	1407	0.20	0.62	870	0.32	
NB	TH	96	1782	0.05	0.32	573	0.17	
NB	RT	274	1472	0.19	0.32	474	0.58	*
SB	TH-RT	935	3445	0.27	0.47	1614	0.58	*

CYCLE=100.0 LOST= 9.0 SUM V/S CRIT= 0.53 TOTAL V/C= 0.58

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.01	0.12	100.0	29.47	158	0.00	0.85	25.05	D	0.0	1
WB	LT-TH	0.58	0.12	100.0	31.64	201	3.00	0.62	21.47	C	2.8	3
WB	RT	0.32	0.62	100.0	6.91	870	0.08	0.62	4.33	A	3.0	3
NB	TH	0.17	0.32	100.0	18.48	573	0.01	0.85	15.72	C	1.8	2
NB	RT	0.58	0.32	100.0	21.49	474	1.31	0.85	19.38	C	5.2	5
SB	TH-RT	0.58	0.47	100.0	14.73	1614	0.39	0.85	12.85	B	13.1	13

DIR	Delay	LOS
EB	25.05	D
WB	9.36	B
NB	18.44	C
SB	12.85	B

INTERSECTION DELAY = 13.26 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 20.2 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
COLUMBUS/MELNEA CASS/BUS DRIVE
MATER PLAN DESIGN (W/TREMONT ACCESS) - SAT PEAK HOUR
date:08-18-1989 time:11:30:02
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I9MPTS GEOMETRICS=P18I9 SIGNAL=P18I9
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	1	0	0	1	0	0.0	15.0	0.0	32
WB	71	8	254	0	1	1	0.0	12.0	12.0	26
NB	0	52	121	0	1	1	0.0	12.0	12.0	26
SB	0	328	150	0	2	0	0.0	12.0	0.0	52

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	%100.0%	N	0	0	.950	100	N	12.0	3
WB	0.0%	15.0%	N	0	0	.950	50	N	12.0	4
NB	0.0%	2.0%	N	10	0	.950	100	N	17.0	3
SB	0.0%	2.0%	Y	0	0	.950	100	N	17.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1							*					*		*	*		48.5	3	A
2				*				*		*	*						27.0	3	A
3	*	*	*		*	*	*					*				*	15.5	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	1	0	.950	0	1	0
WB	71	8	254	.950	75	8	267
NB	0	52	121	.950	0	55	127
SB	0	328	150	.950	0	345	158

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH	1	1	1.00	1	0.00	0.00
WB	LT-TH	83	1	1.00	83	0.90	0.00
WB	RT	267	1	1.00	267	0.00	1.00
NB	TH	55	1	1.00	55	0.00	0.00
NB	RT	127	1	1.00	127	0.00	1.00
SB	TH-RT	503	2	1.05	528	0.00	0.31

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	1	0	100	100	100	0	1	0	1

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH	1800	1	1.100	0.667	1.000	1.000	1.000	1.000	1.000	1.000	1320
WB	LT-TH	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	1.000	1.000	1674
WB	RT	1800	1	1.000	0.930	1.000	1.000	1.000	1.000	0.838	1.000	1404
NB	TH	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	1782
NB	RT	1800	1	1.000	0.990	1.000	1.000	1.000	1.000	0.826	1.000	1472
SB	TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.953	1.000	3397

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
WB	100	15	1	83	276	75	0.90	1	1	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
WB	1800	0.001	15.443	0.874	0.899	0.049	0.101	0.012	1.287	1.000	1.000

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	TH	1	1320	0.00	0.15	205	0.01	
WB	LT-TH	83	1674	0.05	0.15	259	0.32	*
WB	RT	267	1404	0.19	0.67	941	0.28	
NB	TH	55	1782	0.03	0.27	481	0.11	
NB	RT	127	1472	0.09	0.27	397	0.32	*
SB	TH-RT	528	3397	0.16	0.49	1648	0.32	*

CYCLE=100.0 LOST= 9.0 SUM V/S CRIT= 0.29 TOTAL V/C= 0.32

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	TH	0.01	0.15	100.0	27.16	205	0.00	0.85	23.09	C	0.0	1
WB	LT-TH	0.32	0.15	100.0	28.56	259	0.26	0.62	17.86	C	2.0	2
WB	RT	0.28	0.67	100.0	5.11	941	0.05	0.62	3.20	A	2.4	2
NB	TH	0.11	0.27	100.0	20.90	481	0.00	0.85	17.77	C	1.1	1
NB	RT	0.32	0.27	100.0	22.18	397	0.17	0.85	18.99	C	2.6	3
SB	TH-RT	0.32	0.49	100.0	11.92	1648	0.04	0.85	10.17	B	7.2	7

DIR	Delay	LOS
EB	23.09	C
WB	6.68	B
NB	18.63	C
SB	10.17	B

INTERSECTION DELAY = 10.48 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 13.0 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
MELNEA CASS/WASHINGTON
MASTER PLAN DESIGN (W/IMPROVEMENTS) - AM PEAK HOUR
date:08-22-1989 time:15:46:30
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I12MPAM GEOMETRICS=P18I12 SIGNAL=P18I12
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	1037	46	0	2	0	0.0	12.0	0.0	48
WB	57	1190	29	0	2	0	0.0	12.0	0.0	48
NB	119	556	29	1	2	0	10.0	11.0	0.0	34
SB	15	188	25	1	2	0	10.0	11.0	0.0	34

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	8.0%	N	0	0	.880	100	N	16.0	3
WB	0.0%	8.0%	N	0	0	.880	100	N	16.0	3
NB	0.0%	12.0%	N	0	20	.880	100	N	12.5	3
SB	0.0%	12.0%	N	0	20	.880	100	N	12.5	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*									*				*	0.0	0	A
2	*	*	*		*	*	*					*				*	71.1	3	A
3				*				*					*	*	*		0.1	0	A
4				*				*	*	*	*		*	*	*		22.8	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	1037	46	.880	0	1178	52
WB	57	1190	29	.880	65	1352	33
NB	119	556	29	.880	135	632	33
SB	15	188	25	.880	17	214	28

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH-RT	1231	2	1.05	1292	0.00	0.04
WB	LT-TH-RT	1450	2	1.05	1522	0.04	0.02
NB	LT	135	1	1.00	135	1.00	0.00
NB	TH-RT	665	2	1.05	698	0.00	0.05
SB	LT	17	1	1.00	17	1.00	0.00
SB	TH-RT	242	2	1.05	254	0.00	0.12

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	1178	52	100	100	100	0	2	0	1231
NORTHBOUND	17	214	28	0	100	100	1	2	0	242
SOUTHBOUND	135	632	33	100	100	100	1	2	0	665

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH-RT	1800	2	1.000	0.962	1.000	1.000	1.000	1.000	0.992	1.000	3432
WB	LT-TH-RT	1800	2	1.000	0.962	1.000	1.000	1.000	1.000	0.996	0.635	2187
NB	LT	1800	1	0.933	0.943	1.000	1.000	1.000	1.000	1.000	0.662	1050
NB	TH-RT	1800	2	0.967	0.943	1.000	1.000	0.958	1.000	0.990	1.000	3115

```
SB  LT        1800  1 0.933 0.943 1.000 1.000 1.000 1.000 1.000 0.950 1506
SB  TH-RT     1800  2 0.967 0.943 1.000 1.000 0.958 1.000 0.977 1.000 3073

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB 100  71  2 1450 1399   65 0.04  2 1231 0.00
NB 100  23  1  135  665  135 1.00  2  242 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf      El    Fm   Flt
WB 3600 0.342 56.120 0.106 0.349 15.001 0.651  3.581  10.631 0.269 0.635
NB 3600 0.067 17.279 0.724 1.000  5.549 0.000  0.000   1.554 0.662 0.662

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH-RT    1292 3432 0.38 0.71 2441 0.53
WB  LT-TH-RT 1522 2187 0.70 0.71 1555 0.98     *
NB  LT        135 1050 0.13 0.23  240 0.56
NB  TH-RT     698 3115 0.22 0.23  711 0.98     *
SB  LT         17 1506 0.00 0.00   99 0.17     *
SB  TH-RT     254 3073 0.08 0.23  703 0.36

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.92 TOTAL V/C= 0.98
FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 63 LEFT TURNS ON THE CHANGE INTERVAL AND  35 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH-RT    0.53 0.71 100.0  5.08 2441   0.18 0.85   4.47  A   9.9    10
WB  LT-TH-RT 0.98 0.71 100.0 10.43 1555  13.50 0.85  20.35  C  14.0    26
NB  LT       0.56 0.23 100.0 25.98  240   2.27 0.85  24.01  C   2.9     4
NB  TH-RT    0.98 0.23 100.0 29.17  711  21.87 0.85  43.38  E  15.1    25
SB  LT       0.17 0.23 100.0 23.53   99   0.09 1.00  23.62  C   0.5     1
SB  TH-RT    0.36 0.23 100.0 24.64  703   0.14 0.85  21.07  C   5.2     5

DIR Delay LOS
EB   4.47  A
WB  20.35  C
NB  40.23  E
SB  21.23  C
INTERSECTION DELAY = 19.40 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 191.6 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is   0.0 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  71.1 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is   0.0 secs green,   0.0 secs yellow + red clear
suggested timing phase 4 is  22.9 secs green,   3.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
MELNEA CASS/WASHINGTON
MASTER PLAN DESIGN (W/IMPROVEMENTS) - PM PEAK HOUR
date:08-22-1989 time:15:53:43
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I12MPPM GEOMETRICS=P18I12 SIGNAL=P18I12
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	1677	88	0	2	0	0.0	12.0	0.0	48
WB	78	1071	23	0	2	0	0.0	12.0	0.0	48
NB	98	425	49	1	2	0	10.0	11.0	0.0	34
SB	45	381	127	1	2	0	10.0	11.0	0.0	34

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	N	0	0	.970	100	N	16.0	3
WB	0.0%	3.0%	N	0	0	.970	100	N	16.0	3
NB	0.0%	8.0%	N	0	20	.970	100	N	12.5	3
SB	0.0%	8.0%	N	0	20	.970	100	N	12.5	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*									*				*	0.0	0	A
2	*	*	*		*	*	*					*				*	74.3	3	A
3				*				*					*	*	*		0.1	0	A
4				*				*	*	*	*		*	*	*		19.5	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	1677	88	.970	0	1729	91
WB	78	1071	23	.970	80	1104	24
NB	98	425	49	.970	101	438	51
SB	45	381	127	.970	46	393	131

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH-RT	1820	2	1.05	1911	0.00	0.05
WB	LT-TH-RT	1208	2	1.05	1269	0.07	0.02
NB	LT	101	1	1.00	101	1.00	0.00
NB	TH-RT	489	2	1.05	513	0.00	0.10
SB	LT	46	1	1.00	46	1.00	0.00
SB	TH-RT	524	2	1.05	550	0.00	0.25

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	1729	91	100	100	100	0	2	0	1399
NORTHBOUND	46	393	131	0	99	99	1	2	0	520
SOUTHBOUND	101	438	51	100	100	100	1	2	0	489

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH-RT	1800	2	1.000	0.985	1.000	1.000	1.000	1.000	0.990	1.000	3512
WB	LT-TH-RT	1800	2	1.000	0.985	1.000	1.000	1.000	1.000	0.996	0.527	1862
NB	LT	1800	1	0.933	0.962	1.000	1.000	1.000	1.000	1.000	0.354	571
NB	TH-RT	1800	2	0.967	0.962	1.000	1.000	0.958	1.000	0.980	1.000	3141
SB	LT	1800	1	0.933	0.962	1.000	1.000	1.000	1.000	1.000	0.950	1535

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SB  TH-RT     1800  2 0.967 0.962 1.000 1.000 0.958 1.000 0.951 1.000 3048

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB 100  74  2 1208 1208   80 0.07  2 1399 0.00
NB 100  20  1  101  489  101 1.00  2  520 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
WB 3600 0.389 57.996 0.001 1.000 16.323 0.000  0.000 1800.000 0.054 0.527
NB 3600 0.144  5.957 0.550 1.000 13.583 0.000  0.000    2.045 0.354 0.354

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH-RT    1911 3512 0.54 0.74 2610 0.73
WB  LT-TH-RT 1269 1862 0.68 0.74 1384 0.92     *
NB  LT        101  571 0.18 0.20  112 0.90
NB  TH-RT     513 3141 0.16 0.20  614 0.84
SB  LT         46 1535 0.00 0.00  123 0.38
SB  TH-RT     550 3048 0.18 0.20  600 0.92     *

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.86 TOTAL V/C= 0.92
FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 65 LEFT TURNS ON THE CHANGE INTERVAL AND  56 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c      d2   PF   Delay LOS Avg Q  95% Q
EB  TH-RT    0.73 0.74 100.0   5.50 2610    0.76 0.85    5.32  B  13.0   13
WB  LT-TH-RT 0.92 0.74 100.0   7.86 1384    7.13 0.85   12.75  B   8.6   14
NB  LT       0.90 0.20 100.0  29.88  112   39.26 0.85   58.77  E   2.8    6
NB  TH-RT    0.84 0.20 100.0  29.40  614    6.84 0.85   30.81  D  10.9   13
SB  LT       0.38 0.20 100.0  26.48  123    0.93 1.00   27.41  D   1.3    2
SB  TH-RT    0.92 0.20 100.0  29.91  600   13.63 0.85   37.01  D  11.7   17

DIR Delay LOS
EB   5.32  B
WB  12.75  B
NB  35.41  D
SB  36.26  D
INTERSECTION DELAY = 15.88 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  64.5 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is   0.0 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  74.3 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is   0.1 secs green,   0.0 secs yellow + red clear
suggested timing phase 4 is  19.6 secs green,   3.0 secs yellow + red clear

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
MELNEA CASS/WASHINGTON
MASTER PLAN DESIGN (W/IMPROVEMENTS) - SAT PEAK HOUR
date:08-22-1989 time:15:58:08
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I12MPS GEOMETRICS=P18I12 SIGNAL=P18I12
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	0	1168	64	0	2	0	0.0	12.0	0.0	48
WB	59	817	17	0	2	0	0.0	12.0	0.0	48
NB	98	425	49	1	2	0	10.0	11.0	0.0	34
SB	41	342	114	1	2	0	10.0	11.0	0.0	34

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	50	N	16.0	3
WB	0.0%	2.0%	N	0	0	.950	50	N	16.0	3
NB	0.0%	5.0%	N	0	15	.950	50	N	12.5	3
SB	0.0%	5.0%	N	0	15	.950	50	N	12.5	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*	*	*									*				*	0.0	0	A
2	*	*	*		*	*	*					*				*	70.5	3	A
3				*				*					*	*	*		0.3	0	A
4				*				*	*	*	*		*	*	*		23.2	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	0	1168	64	.950	0	1229	67
WB	59	817	17	.950	62	860	18
NB	98	425	49	.950	103	447	52
SB	41	342	114	.950	43	360	120

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	TH-RT	1297	2	1.05	1362	0.00	0.05
WB	LT-TH-RT	940	2	1.05	987	0.07	0.02
NB	LT	103	1	1.00	103	1.00	0.00
NB	TH-RT	499	2	1.05	524	0.00	0.10
SB	LT	43	1	1.00	43	1.00	0.00
SB	TH-RT	480	2	1.05	504	0.00	0.25

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN BEING OPPOSED	OPPOSING APPROACH VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
WESTBOUND	0	1229	67	100	100	100	0	2	0	1297
NORTHBOUND	43	360	120	0	99	99	1	2	0	473
SOUTHBOUND	103	447	52	100	100	100	1	2	0	499

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.991	1.000	3532
WB	LT-TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.997	0.564	2003
NB	LT	1800	1	0.933	0.976	1.000	1.000	1.000	1.000	1.000	0.429	704
NB	TH-RT	1800	2	0.967	0.976	1.000	1.000	0.969	1.000	0.982	1.000	3230

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SB  LT        1800  1 0.933 0.976 1.000 1.000 1.000 1.000 1.000 0.950 1557
SB  TH-RT     1800  2 0.967 0.976 1.000 1.000 0.969 1.000 0.957 1.000 3146

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
WB 100  70  2  940  940   62 0.07  2 1297 0.00
NB 100  23  1  103  499  103 1.00  2  473 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf      El    Fm   Flt
WB 3600 0.360 53.849 0.064 0.650 16.625 0.350  1.076  17.449 0.127 0.564
NB 3600 0.131 11.570 0.579 1.000 11.625 0.000  0.000   1.942 0.429 0.429

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  TH-RT    1362 3532 0.39 0.70 2489 0.55
WB  LT-TH-RT  987 2003 0.49 0.70 1411 0.70     *
NB  LT        103  704 0.15 0.23  163 0.63
NB  TH-RT     524 3230 0.16 0.23  749 0.70     *
SB  LT         43 1557 0.00 0.00  160 0.27     *
SB  TH-RT     504 3146 0.16 0.24  740 0.68

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.66 TOTAL V/C= 0.70
FOR THE SOUTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 66 LEFT TURNS ON THE CHANGE INTERVAL AND  89 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c     d2   PF   Delay LOS Avg Q  95% Q
EB  TH-RT    0.55 0.70 100.0  5.39 2489  0.20 0.85   4.75  A  10.6   11
WB  LT-TH-RT 0.70 0.70 100.0  6.53 1411  1.09 0.85   6.48  B   7.7    8
NB  LT       0.63 0.23 100.0 26.27  163  5.27 0.85  26.81  D   2.2    3
NB  TH-RT    0.70 0.23 100.0 26.76  749  2.02 0.85  24.46  C  10.6   11
SB  LT       0.27 0.24 100.0 23.73  160  0.23 1.00  23.97  C   1.2    1
SB  TH-RT    0.68 0.24 100.0 26.46  740  1.79 0.85  24.01  C  10.2   11

DIR Delay LOS
EB   4.75  A
WB   6.48  B
NB  24.85  C
SB  24.01  C
INTERSECTION DELAY = 11.80 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  19.4 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is   0.0 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  70.6 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is   0.1 secs green,   0.0 secs yellow + red clear
suggested timing phase 4 is  23.2 secs green,   3.0 secs yellow + red clear

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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
MELNEA CASS/MASSACHUSETTS/SOUTHHAMPTON/X-WAY RAMPS
MASTER PLAN DESIGN - AM PEAK HOUR
date:08-13-1989 time:04:24:54
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I13MPAM GEOMETRICS=P18I13 SIGNAL=P18I13
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	466	435	1	2	2	0	11.0	12.0	0.0	0
WB	285	953	0	1	3	0	12.0	12.0	0.0	0
NB	12	611	334	1	3	0	11.0	12.0	0.0	0
SB	273	892	946	1	2	2	10.0	12.0	10.0	0

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	N	0	0	.920	0	N	4.0	3
WB	0.0%	13.0%	N	0	0	.920	0	N	4.0	3
NB	0.0%	10.0%	N	0	0	.920	0	N	4.0	3
SB	0.0%	10.0%	N	0	0	.920	0	N	4.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*				*							*			*		19.9	0	A
2		*	*			*	*					*				*	23.2	3	A
3				*				*	*					*		*	20.2	0	A
4				*				*		*	*			*	*		30.7	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	466	435	1	.920	507	473	1
WB	285	953	0	.920	310	1036	0
NB	12	611	334	.920	13	664	363
SB	273	892	946	.920	297	970	1028

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	507	2	1.05	532	1.00	0.00
EB	TH-RT	474	2	1.05	498	0.00	0.00
WB	LT	310	1	1.00	310	1.00	0.00
WB	TH	1036	3	1.10	1139	0.00	0.00
NB	LT	13	1	1.00	13	1.00	0.00
NB	TH-RT	1027	3	1.10	1130	0.00	0.35
SB	LT	297	1	1.00	297	1.00	0.00
SB	TH	970	2	1.05	1018	0.00	0.00
SB	RT	1028	2	1.05	1080	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	310	1036	0	100	0	0	1	3	0	0

WESTBOUND	507	473	1	100	0	0	2	2	0	0
NORTHBOUND	297	970	1028	100	0	0	1	2	2	0
SOUTHBOUND	13	664	363	100	0	0	1	3	0	0

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	2	0.967	0.985	1.000	1.000	1.000	1.000	1.000	0.920	3154
EB	TH-RT	1800	2	1.000	0.985	1.000	1.000	1.000	1.000	1.000	1.000	3546
WB	LT	1800	1	1.000	0.939	1.000	1.000	1.000	1.000	1.000	0.950	1606
WB	TH	1800	3	1.000	0.939	1.000	1.000	1.000	1.000	1.000	1.000	5070
NB	LT	1800	1	0.967	0.952	1.000	1.000	1.000	1.000	1.000	0.950	1574
NB	TH-RT	1800	3	1.000	0.952	1.000	1.000	1.000	1.000	0.947	1.000	4870
SB	LT	1800	1	0.933	0.952	1.000	1.000	1.000	1.000	1.000	0.950	1520
SB	TH	1800	2	1.000	0.952	1.000	1.000	1.000	1.000	1.000	1.000	3429
SB	RT	1800	2	0.933	0.952	1.000	1.000	1.000	1.000	0.750	1.000	2400

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT	532	3154	0.17	0.20	629	0.85	
EB	TH-RT	498	3546	0.14	0.23	823	0.60	
WB	LT	310	1606	0.19	0.20	320	0.97	*
WB	TH	1139	5070	0.22	0.23	1177	0.97	*
NB	LT	13	1574	0.01	0.20	318	0.04	
NB	TH-RT	1130	4870	0.23	0.31	1494	0.76	
SB	LT	297	1520	0.20	0.20	307	0.97	*
SB	TH	1018	3429	0.30	0.31	1052	0.97	*
SB	RT	1080	2400	0.45	0.71	1699	0.64	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.91 TOTAL V/C= 0.97

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.85	0.20	100.0	29.30	629	7.26	1.00	36.56	D	11.3	16
EB	TH-RT	0.60	0.23	100.0	26.06	823	0.92	0.85	22.93	C	10.1	10
WB	LT	0.97	0.20	100.0	30.18	320	30.82	1.00	61.01	F	8.7	17
WB	TH	0.97	0.23	100.0	28.90	1177	14.10	0.85	36.55	D	22.1	32
NB	LT	0.04	0.20	100.0	24.42	318	0.00	1.00	24.42	C	0.3	1
NB	TH-RT	0.76	0.31	100.0	23.78	1494	1.59	0.85	21.56	C	19.8	20
SB	LT	0.97	0.20	100.0	30.09	307	31.59	1.00	61.68	F	8.4	16
SB	TH	0.97	0.31	100.0	25.97	1052	15.14	0.85	34.94	D	18.7	29
SB	RT	0.64	0.71	100.0	5.90	1699	0.57	0.85	5.49	B	8.3	8

DIR	Delay	LOS
EB	29.97	D
WB	41.77	E
NB	21.60	C
SB	24.98	C

INTERSECTION DELAY = 29.24 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 141.8 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
MELNEA CASS/MASSACHUSETTS/SOUTHHAMPTON/X-WAY RAMPS
MASTER PLAN DESIGN - PM PEAK HOUR
date:08-13-1989 time:04:43:57
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I13MPPM GEOMETRICS=P18I13 SIGNAL=P18I13
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	764	398	2	2	2	0	11.0	12.0	0.0	0
WB	370	435	0	1	3	0	12.0	12.0	0.0	0
NB	20	815	393	1	3	0	11.0	12.0	0.0	0
SB	205	909	676	1	2	2	10.0	12.0	10.0	0

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	3.0%	N	0	0	.930	0	N	4.0	3
WB	0.0%	13.0%	N	0	0	.930	0	N	4.0	3
NB	0.0%	10.0%	N	0	0	.930	0	N	4.0	3
SB	0.0%	10.0%	N	0	0	.930	0	N	4.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*				*							*			*		30.4	0	A
2		*	*			*	*					*				*	14.2	3	A
3				*				*	*					*		*	16.1	0	A
4				*				*		*	*				*	*	33.3	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	764	398	2	.930	822	428	2
WB	370	435	0	.930	398	468	0
NB	20	815	393	.930	22	876	423
SB	205	909	676	.930	220	977	727

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	822	2	1.05	863	1.00	0.00
EB	TH-RT	430	2	1.05	452	0.00	0.01
WB	LT	398	1	1.00	398	1.00	0.00
WB	TH	468	3	1.10	515	0.00	0.00
NB	LT	22	1	1.00	22	1.00	0.00
NB	TH-RT	1299	3	1.10	1429	0.00	0.33
SB	LT	220	1	1.00	220	1.00	0.00
SB	TH	977	2	1.05	1026	0.00	0.00
SB	RT	727	2	1.05	763	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	398	468	0	100	0	0	1	3	0	0
WESTBOUND	822	428	2	100	0	0	2	2	0	0

NORTHBOUND	220	977	727	100	0	0	1	2	2		0
SOUTHBOUND	22	876	423	100	0	0	1	3	0		0

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	2	0.967	0.985	1.000	1.000	1.000	1.000	1.000	0.920	3154
EB	TH-RT	1800	2	1.000	0.985	1.000	1.000	1.000	1.000	0.999	1.000	3544
WB	LT	1800	1	1.000	0.939	1.000	1.000	1.000	1.000	1.000	0.950	1606
WB	TH	1800	3	1.000	0.939	1.000	1.000	1.000	1.000	1.000	1.000	5070
NB	LT	1800	1	0.967	0.952	1.000	1.000	1.000	1.000	1.000	0.950	1574
NB	TH-RT	1800	3	1.000	0.952	1.000	1.000	1.000	1.000	0.951	1.000	4892
SB	LT	1800	1	0.933	0.952	1.000	1.000	1.000	1.000	1.000	0.950	1520
SB	TH	1800	2	1.000	0.952	1.000	1.000	1.000	1.000	1.000	1.000	3429
SB	RT	1800	2	0.933	0.952	1.000	1.000	1.000	1.000	0.750	1.000	2400

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT	863	3154	0.27	0.30	959	0.90	*
EB	TH-RT	452	3544	0.13	0.14	502	0.90	*
WB	LT	398	1606	0.25	0.30	488	0.81	
WB	TH	515	5070	0.10	0.14	719	0.72	
NB	LT	22	1574	0.01	0.16	254	0.08	
NB	TH-RT	1429	4892	0.29	0.33	1628	0.88	
SB	LT	220	1520	0.15	0.16	245	0.90	*
SB	TH	1026	3429	0.30	0.33	1141	0.90	*
SB	RT	763	2400	0.32	0.80	1916	0.40	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.85 TOTAL V/C= 0.90

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.90	0.30	100.0	25.33	959	8.09	1.00	33.41	D	15.9	24
EB	TH-RT	0.90	0.14	100.0	32.08	502	13.46	0.85	38.71	D	10.3	15
WB	LT	0.81	0.30	100.0	24.46	488	7.09	1.00	31.56	D	7.7	11
WB	TH	0.72	0.14	100.0	31.15	719	2.38	0.85	28.50	D	11.2	12
NB	LT	0.08	0.16	100.0	27.10	254	0.00	1.00	27.11	D	0.5	1
NB	TH-RT	0.88	0.33	100.0	23.89	1628	4.15	0.85	23.84	C	24.1	27
SB	LT	0.90	0.16	100.0	31.27	245	22.60	1.00	53.87	E	5.9	11
SB	TH	0.90	0.33	100.0	24.14	1141	7.01	0.85	26.47	D	18.1	22
SB	RT	0.40	0.80	100.0	2.27	1916	0.08	0.85	1.99	A	4.1	4

DIR	Delay	LOS
EB	35.23	D
WB	29.83	D
NB	23.88	C
SB	20.18	C

INTERSECTION DELAY = 26.15 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 54.4 SECONDS
THE EXISTING TIMING IS OPTIMAL

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
MELNEA CASS/MASSACHUSETTS/SOUTHHAMPTON/X-WAY RAMPS
MASTER PLAN DESIGN - SAT PEAK HOUR
date:08-17-1989 time:11:25:26
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I13MPS GEOMETRICS=P18I13 SIGNAL=P18I13
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	573	298	2	2	2	0	11.0	12.0	0.0	0
WB	277	327	0	1	3	0	12.0	12.0	0.0	0
NB	16	528	289	1	3	0	11.0	12.0	0.0	0
SB	154	695	490	1	2	2	10.0	12.0	10.0	0

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.920	0	N	4.0	3
WB	0.0%	5.0%	N	0	0	.920	0	N	4.0	3
NB	0.0%	2.0%	N	0	0	.920	0	N	4.0	3
SB	0.0%	2.0%	N	0	0	.920	0	N	4.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1	*				*							*			*		30.7	0	A
2		*	*			*	*					*				*	14.3	3	A
3				*				*	*					*		*	15.8	0	A
4				*				*		*	*			*	*		33.2	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	573	298	2	.920	623	324	2
WB	277	327	0	.920	301	355	0
NB	16	528	289	.920	17	574	314
SB	154	695	490	.920	167	755	533

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	623	2	1.05	654	1.00	0.00
EB	TH-RT	326	2	1.05	342	0.00	0.01
WB	LT	301	1	1.00	301	1.00	0.00
WB	TH	355	3	1.10	391	0.00	0.00
NB	LT	17	1	1.00	17	1.00	0.00
NB	TH-RT	888	3	1.10	977	0.00	0.35
SB	LT	167	1	1.00	167	1.00	0.00
SB	TH	755	2	1.05	793	0.00	0.00
SB	RT	533	2	1.05	559	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	301	355	0	100	0	0	1	3	0	0

WESTBOUND	623	324	2	100	0	0	2	2	0	0	
NORTHBOUND	167	755	533	100	0	0	1	2	2	0	
SOUTHBOUND	17	574	314	100	0	0	1	3	0	0	

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.920	3170
EB	TH-RT	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	0.999	1.000	3561
WB	LT	1800	1	1.000	0.976	1.000	1.000	1.000	1.000	1.000	0.950	1668
WB	TH	1800	3	1.000	0.976	1.000	1.000	1.000	1.000	1.000	1.000	5268
NB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1637
NB	TH-RT	1800	3	1.000	0.990	1.000	1.000	1.000	1.000	0.947	1.000	5063
SB	LT	1800	1	0.933	0.990	1.000	1.000	1.000	1.000	1.000	0.950	1580
SB	TH	1800	2	1.000	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3564
SB	RT	1800	2	0.933	0.990	1.000	1.000	1.000	1.000	0.750	1.000	2495

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT	654	3170	0.21	0.31	974	0.67	*
EB	TH-RT	342	3561	0.10	0.14	510	0.67	*
WB	LT	301	1668	0.18	0.31	513	0.59	
WB	TH	391	5268	0.07	0.14	755	0.52	
NB	LT	17	1637	0.01	0.16	258	0.07	
NB	TH-RT	977	5063	0.19	0.33	1679	0.58	
SB	LT	167	1580	0.11	0.16	249	0.67	*
SB	TH	793	3564	0.22	0.33	1182	0.67	*
SB	RT	559	2495	0.22	0.80	1988	0.28	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.63 TOTAL V/C= 0.67

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.67	0.31	100.0	22.97	974	1.27	1.00	24.24	C	12.0	14
EB	TH-RT	0.67	0.14	100.0	30.86	510	2.38	0.85	28.26	D	7.8	9
WB	LT	0.59	0.31	100.0	22.24	513	1.29	1.00	23.53	C	5.8	7
WB	TH	0.52	0.14	100.0	30.13	755	0.52	0.85	26.05	D	8.5	9
NB	LT	0.07	0.16	100.0	27.24	258	0.00	1.00	27.24	D	0.4	1
NB	TH-RT	0.58	0.33	100.0	21.04	1679	0.39	0.85	18.21	C	16.5	16
SB	LT	0.67	0.16	100.0	30.15	249	4.68	1.00	34.82	D	3.9	6
SB	TH	0.67	0.33	100.0	21.84	1182	1.06	0.85	19.46	C	14.0	14
SB	RT	0.28	0.80	100.0	2.02	1988	0.02	0.85	1.74	A	3.0	3

DIR	Delay	LOS
EB	25.62	D
WB	24.96	C
NB	18.37	C
SB	14.63	B

INTERSECTION DELAY = 19.82 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 17.9 SECONDS
THE EXISTING TIMING IS OPTIMAL

Level of Service Calculations

Master Plan Design (1996) Conditions
With Build Mitigation
(AM, PM and SAT peak hours)

- Tremont/Ruggles/Whittier

- Tremont/Melnea Cass
  Access Option 1 (Without Tremont Access)
  Access Option 2 (With Tremont Right In/Out)
  Access Option 3 (With Tremont Access)

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/RUGGLES/WHITTIER
MASTER PLAN DESIGN (MITIGATED - NB DBL LFT) - AM PEAK HOUR
date:08-25-1989 time:17:25:00
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I1MPAM GEOMETRICS=P18I1ML SIGNAL=P18I1M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	763	0	307	2	0	1	11.0	0.0	15.0	50
WB	40	36	24	0	1	0	0.0	10.0	0.0	24
NB	478	1576	0	2	2	0	11.0	11.0	0.0	42
SB	0	914	914	0	2	1	0.0	11.0	15.0	42

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	-2.0%	2.0%	N	0	0	.960	200	N	16.5	4
WB	0.0%	2.0%	Y	2	0	.960	100	N	16.5	3
NB	0.0%	2.0%	N	0	0	.960	100	N	17.5	3
SB	0.0%	2.0%	N	0	0	.960	200	N	17.5	4

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*						*	13.8	0	A
2				*				*	*	*				*	*		39.8	3	A
3	*		*					*				*			*		28.7	0	A
4	*		*		*	*	*					*					11.8	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	763	0	307	.960	795	0	320
WB	40	36	24	.960	42	38	25
NB	478	1576	0	.960	498	1642	0
SB	0	914	914	.960	0	952	952

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	795	2	1.05	835	1.00	0.00
EB	RT	320	1	1.00	320	0.00	1.00
WB	LT-TH-RT	104	1	1.00	104	0.40	0.24
NB	LT	498	2	1.05	523	1.00	0.00
NB	TH	1642	2	1.05	1724	0.00	0.00
SB	TH	952	2	1.05	1000	0.00	0.00
SB	RT	952	1	1.00	952	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	42	38	25	100	100	100	0	1	0	63
WESTBOUND	795	0	320	0	0	0	2	0	1	0
NORTHBOUND	0	952	952	100	100	0	0	2	1	952

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	2	0.967	0.990	1.010	1.000	1.000	1.000	1.000	0.920	3202
EB	RT	1800	1	1.100	0.990	1.010	1.000	1.000	1.000	0.814	1.000	1613
WB	LT-TH-RT	1800	1	0.933	0.990	1.000	0.890	1.000	1.000	0.845	0.827	1034
NB	LT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.920	3170
NB	TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3446
SB	TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3446
SB	RT	1800	1	1.100	0.990	1.000	1.000	1.000	1.000	0.795	1.000	1558

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT	835	3202	0.21	0.29	1087	0.73	
EB	RT	320	1613	0.20	0.54	875	0.37	
WB	LT-TH-RT	104	1034	0.10	0.12	122	0.86	*
NB	LT	523	3170	0.12	0.14	584	0.85	*
NB	TH	1724	3446	0.50	0.54	1845	0.93	
SB	TH	1000	3446	0.29	0.40	1370	0.73	
SB	RT	952	1558	0.61	0.68	1066	0.89	*

CYCLE=100.0 LOST= 3.0 SUM V/S CRIT= 0.83 TOTAL V/C= 0.86
FOR THE EASTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
70 LEFT TURNS ON THE CHANGE INTERVAL AND 100 ON THE PERMISSIVE PHASE
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
69 LEFT TURNS ON THE CHANGE INTERVAL AND 78 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.73	0.40	100.0	19.14	1087	1.78	1.00	20.92	C	15.7	16
EB	RT	0.37	0.54	100.0	9.93	875	0.12	0.62	6.23	B	4.1	4
WB	LT-TH-RT	0.86	0.12	100.0	32.90	122	28.06	0.85	51.81	E	2.8	5
NB	LT	0.85	0.54	100.0	15.09	584	8.20	1.00	23.29	C	11.9	12
NB	TH	0.93	0.54	100.0	16.40	1845	6.89	0.85	19.79	C	21.2	28
SB	TH	0.73	0.40	100.0	19.42	1370	1.41	0.68	14.20	B	15.9	16
SB	RT	0.89	0.68	100.0	9.73	1066	6.98	0.74	12.45	B	8.3	11

DIR	Delay	LOS
EB	16.85	C
WB	51.81	E
NB	20.61	C
SB	13.35	B

INTERSECTION DELAY = 17.81 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 23.7 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 13.8 secs green, 0.0 secs yellow + red clear
suggested timing phase 2 is 39.7 secs green, 3.0 secs yellow + red clear
suggested timing phase 3 is 28.7 secs green, 0.0 secs yellow + red clear
suggested timing phase 4 is 11.8 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/RUGGLES/WHITTIER
MASTER PLAN DESIGN (MITIGATED - NB DBL LFT) - PM PEAK HOUR
date:08-25-1989 time:17:29:24
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I1MPPM GEOMETRICS=P18I1ML SIGNAL=P18I1M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	932	0	345	2	0	1	11.0	0.0	15.0	50
WB	40	20	26	0	1	0	0.0	10.0	0.0	24
NB	370	1211	0	2	2	0	11.0	11.0	0.0	42
SB	0	1444	1108	0	2	1	0.0	11.0	15.0	42

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	-2.0%	2.0%	N	0	0	.940	200	N	16.5	4
WB	0.0%	2.0%	Y	2	0	.940	100	N	16.5	3
NB	0.0%	2.0%	N	0	0	.940	100	N	17.5	3
SB	0.0%	2.0%	N	0	0	.940	200	N	17.5	4

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*						*	10.5	0	A
2				*				*	*	*				*	*		47.5	3	A
3	*		*					*				*			*		26.7	0	A
4	*		*		*	*	*					*					9.2	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	932	0	345	.940	991	0	367
WB	40	20	26	.940	43	21	28
NB	370	1211	0	.940	394	1288	0
SB	0	1444	1108	.940	0	1536	1179

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	991	2	1.05	1041	1.00	0.00
EB	RT	367	1	1.00	367	0.00	1.00
WB	LT-TH-RT	91	1	1.00	91	0.47	0.30
NB	LT	394	2	1.05	413	1.00	0.00
NB	TH	1288	2	1.05	1353	0.00	0.00
SB	TH	1536	2	1.05	1613	0.00	0.00
SB	RT	1179	1	1.00	1179	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	43	21	28	100	100	100	0	1	0	49
WESTBOUND	991	0	367	0	0	0	2	0	1	0
NORTHBOUND	0	1536	1179	100	100	0	0	2	1	1399

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	2	0.967	0.990	1.010	1.000	1.000	1.000	1.000	0.920	3202
EB	RT	1800	1	1.100	0.990	1.010	1.000	1.000	1.000	0.813	1.000	1610
WB	LT-TH-RT	1800	1	0.933	0.990	1.000	0.890	1.000	1.000	0.830	0.815	1002
NB	LT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.920	3170
NB	TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3446
SB	TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3446
SB	RT	1800	1	1.100	0.990	1.000	1.000	1.000	1.000	0.789	1.000	1547

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT	1041	3202	0.26	0.27	1001	0.99	
EB	RT	367	1610	0.23	0.46	748	0.49	
WB	LT-TH-RT	91	1002	0.09	0.09	93	0.99	*
NB	LT	413	3170	0.10	0.11	402	0.98	*
NB	TH	1353	3446	0.39	0.58	1999	0.68	
SB	TH	1613	3446	0.47	0.48	1637	0.99	
SB	RT	1179	1547	0.76	0.74	1148	1.03	*

CYCLE=100.0 LOST= 3.0 SUM V/S CRIT= 0.96 TOTAL V/C= 0.99
FOR THE EASTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
70 LEFT TURNS ON THE CHANGE INTERVAL AND 76 ON THE PERMISSIVE PHASE
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
69 LEFT TURNS ON THE CHANGE INTERVAL AND 0 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.99	0.36	100.0	24.20	1001	19.78	1.00	43.98	E	22.2	37
EB	RT	0.49	0.46	100.0	14.10	748	0.42	0.62	9.00	B	5.5	5
WB	LT-TH-RT	0.99	0.09	100.0	34.44	93	67.73	0.85	86.85	F	3.4	8
NB	LT	0.98	0.58	100.0	15.49	402	29.36	1.00	44.85	E	9.8	16
NB	TH	0.68	0.58	100.0	11.02	1999	0.65	0.85	9.93	B	15.0	15
SB	TH	0.99	0.48	100.0	19.68	1637	14.18	0.77	26.24	D	22.4	35
SB	RT	1.03	0.74	100.0	10.59	1148	27.12	0.79	29.68	D	13.9	30

DIR	Delay	LOS
EB	34.86	D
WB	86.85	F
NB	18.10	C
SB	27.69	D

INTERSECTION DELAY = 27.46 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
for chosen cycle length 100.0
suggested timing phase 1 is 10.4 secs green, 0.0 secs yellow + red clear
suggested timing phase 2 is 47.5 secs green, 3.0 secs yellow + red clear
suggested timing phase 3 is 26.8 secs green, 0.0 secs yellow + red clear
suggested timing phase 4 is 9.3 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/RUGGLES/WHITTIER
MASTER PLAN DESIGN (MITIGATED - NB DBL LFT) - SAT PEAK HOUR
date:08-25-1989 time:17:34:16
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I1MPS GEOMETRICS=P18I1ML SIGNAL=P18I1M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	642	0	288	2	0	1	11.0	0.0	15.0	50
WB	16	14	17	0	1	0	0.0	10.0	0.0	24
NB	290	1103	0	2	2	0	11.0	11.0	0.0	42
SB	0	1214	417	0	2	1	0.0	11.0	15.0	42

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	-2.0%	2.0%	N	0	0	.920	200	N	16.5	4
WB	0.0%	2.0%	Y	2	0	.920	100	N	16.5	3
NB	0.0%	2.0%	N	0	0	.920	100	N	17.5	3
SB	0.0%	2.0%	N	0	0	.920	200	N	17.5	4

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*						*	10.3	0	A
2				*				*	*	*				*	*		52.6	3	A
3	*		*					*				*			*		24.5	0	A
4	*		*		*	*	*					*					6.6	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	642	0	288	.920	698	0	313
WB	16	14	17	.920	17	15	18
NB	290	1103	0	.920	315	1199	0
SB	0	1214	417	.920	0	1320	453

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT	698	2	1.05	733	1.00	0.00
EB	RT	313	1	1.00	313	0.00	1.00
WB	LT-TH-RT	51	1	1.00	51	0.34	0.36
NB	LT	315	2	1.05	331	1.00	0.00
NB	TH	1199	2	1.05	1259	0.00	0.00
SB	TH	1320	2	1.05	1386	0.00	0.00
SB	RT	453	1	1.00	453	0.00	1.00

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	17	15	18	100	100	100	0	1	0	34
WESTBOUND	698	0	313	0	0	0	2	0	1	0
NORTHBOUND	0	1320	453	100	100	0	0	2	1	1320

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT	1800	2	0.967	0.990	1.010	1.000	1.000	1.000	1.000	0.920	3202
EB	RT	1800	1	1.100	0.990	1.010	1.000	1.000	1.000	0.814	1.000	1612
WB	LT-TH-RT	1800	1	0.933	0.990	1.000	0.890	1.000	1.000	0.817	0.838	1013
NB	LT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.920	3170
NB	TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3446
SB	TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3446
SB	RT	1800	1	1.100	0.990	1.000	1.000	1.000	1.000	0.785	1.000	1539

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT	733	3202	0.19	0.24	912	0.77	*
EB	RT	313	1612	0.19	0.41	667	0.47	
WB	LT-TH-RT	51	1013	0.05	0.07	67	0.76	*
NB	LT	331	3170	0.08	0.10	414	0.76	*
NB	TH	1259	3446	0.37	0.63	2167	0.58	
SB	TH	1386	3446	0.40	0.53	1813	0.76	*
SB	RT	453	1539	0.29	0.77	1187	0.38	

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.72 TOTAL V/C= 0.76
FOR THE EASTBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
70 LEFT TURNS ON THE CHANGE INTERVAL AND 58 ON THE PERMISSIVE PHASE
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
69 LEFT TURNS ON THE CHANGE INTERVAL AND 19 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT	0.77	0.31	100.0	23.68	912	2.74	1.00	26.41	D	14.6	16
EB	RT	0.47	0.41	100.0	16.21	667	0.40	0.62	10.30	B	5.1	5
WB	LT-TH-RT	0.76	0.07	100.0	34.91	67	25.50	0.85	51.35	E	1.4	3
NB	LT	0.76	0.63	100.0	10.03	414	5.53	1.00	15.56	C	7.9	8
NB	TH	0.58	0.63	100.0	8.24	2167	0.30	0.85	7.25	B	12.4	12
SB	TH	0.76	0.53	100.0	14.26	1813	1.40	0.70	10.91	B	17.4	17
SB	RT	0.38	0.77	100.0	2.82	1187	0.10	0.62	1.81	A	2.9	3

DIR	Delay	LOS
EB	21.59	C
WB	51.35	E
NB	8.98	B
SB	8.67	B

INTERSECTION DELAY = 12.25 INTERSECTION LOS=B

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 24.6 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 10.2 secs green, 0.0 secs yellow + red clear
suggested timing phase 2 is 52.6 secs green, 3.0 secs yellow + red clear
suggested timing phase 3 is 24.5 secs green, 0.0 secs yellow + red clear
suggested timing phase 4 is 6.6 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
MASTER PLAN DESIGN (W/O TREMONT ACCESS - MITIGATED) - AM PEAK HOUR
date:08-22-1989 time:16:10:44
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2MPNAM GEOMETRICS=P18I2M3 SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	9	114	282	0	2	1	0.0	11.0	11.0	44
WB	0	1653	68	0	3	0	0.0	11.0	0.0	49
NB	725	923	0	2	2	0	11.0	11.0	0.0	56
SB	62	498	21	1	2	0	11.0	11.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	100	N	16.3	4
WB	0.0%	2.0%	N	0	0	.950	50	N	16.3	3
NB	0.0%	2.0%	N	0	0	.950	100	N	15.0	4
SB	0.0%	2.0%	N	0	0	.950	100	N	15.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							23.8	0	A
2				*				*	*	*			*	*	*		18.9	3	A
3						*	*					*				*	43.8	3	A
4	*	*	*									*				*	4.5	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	9	114	282	.950	9	120	297
WB	0	1653	68	.950	0	1740	72
NB	725	923	0	.950	763	972	0
SB	62	498	21	.950	65	524	22

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	129	2	1.05	136	0.07	0.00
EB	RT	297	1	1.00	297	0.00	1.00
WB	TH-RT	1812	3	1.10	1993	0.00	0.04
NB	LT	763	2	1.05	801	1.00	0.00
NB	TH	972	2	1.05	1020	0.00	0.00
SB	LT	65	1	1.00	65	1.00	0.00
SB	TH-RT	546	2	1.05	574	0.00	0.04

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	1740	72	0	0	0	0	3	0	0
NORTHBOUND	65	524	22	100	100	100	1	2	0	546
SOUTHBOUND	763	972	0	0	44	0	2	2	0	430

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.986	3396
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.842	1.000	1451
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.992	1.000	5128

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NB  LT        1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.920 3170
NB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3446
SB  LT        1800  1 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.437  753
SB  TH-RT     1800  2 0.967 0.990 1.000 1.000 1.000 1.000 0.992 1.000 3418

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
SB 100  19  1   65  546   65 1.00  2  430 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
SB 3600 0.119  7.906 0.606 1.000 10.993 0.000  0.000    1.855 0.437 0.437

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH     136 3396 0.04 0.05  153 0.89     *
EB  RT        297 1451 0.20 0.28  411 0.72
WB  TH-RT    1993 5128 0.39 0.44 2244 0.89     *
NB  LT        801 3170 0.21 0.24  860 0.89     *
NB  TH       1020 3446 0.30 0.43 1472 0.69
SB  LT         65  753 0.09 0.19  142 0.46
SB  TH-RT     574 3418 0.17 0.19  646 0.89     *

CYCLE=100.0  LOST= 9.0  SUM V/S CRIT= 0.81 TOTAL V/C= 0.89
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  36 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1    c     d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH    0.89 0.05 100.0 36.10  153  29.00 0.74   48.38  E   3.5    6
EB  RT       0.72 0.28 100.0 24.53  411   4.19 0.68   19.49  C   5.9    6
WB  TH-RT    0.89 0.44 100.0 19.66 2244   3.46 0.85   19.65  C  28.3   31
NB  LT       0.89 0.43 100.0 20.07  860   7.92 1.00   27.99  D  16.1   19
NB  TH       0.69 0.43 100.0 17.71 1472   1.00 0.67   12.45  B  15.5   15
SB  LT       0.46 0.19 100.0 27.37  142   1.66 0.85   24.67  C   1.5    2
SB  TH-RT    0.89 0.19 100.0 30.03  646  10.08 0.85   34.09  D  12.3   16

DIR Delay LOS
EB  28.56  D
WB  19.65  C
NB  19.28  C
SB  33.13  D
INTERSECTION DELAY = 22.07 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  60.2 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  23.8 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  18.9 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  43.8 secs green,   3.0 secs yellow + red clear
suggested timing phase 4 is   4.5 secs green,   3.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
MASTER PLAN DESIGN (W/O TREMONT ACCESS - MITIGATED) - PM PEAK HOUR
date:08-22-1989 time:16:20:10
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2MPNPM GEOMETRICS=P18I2M3 SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	20	446	701	0	2	1	0.0	11.0	11.0	44
WB	0	1651	51	0	3	0	0.0	11.0	0.0	49
NB	447	686	0	2	2	0	11.0	11.0	0.0	56
SB	81	611	26	1	2	0	11.0	11.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.930	100	N	16.3	4
WB	0.0%	2.0%	N	0	0	.930	50	N	16.3	3
NB	0.0%	2.0%	N	0	0	.930	100	N	15.0	4
SB	0.0%	2.0%	N	0	0	.930	100	N	15.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							19.3	0	A
2				*				*	*	*			*	*	*		17.5	3	A
3						*	*					*				*	32.5	3	A
4	*	*	*									*				*	21.8	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	20	446	701	.930	22	480	754
WB	0	1651	51	.930	0	1775	55
NB	447	686	0	.930	481	738	0
SB	81	611	26	.930	87	657	28

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	501	2	1.05	526	0.04	0.00
EB	RT	754	1	1.00	754	0.00	1.00
WB	TH-RT	1830	3	1.10	2013	0.00	0.03
NB	LT	481	2	1.05	505	1.00	0.00
NB	TH	738	2	1.05	775	0.00	0.00
SB	LT	87	1	1.00	87	1.00	0.00
SB	TH-RT	685	2	1.05	719	0.00	0.04

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	1775	55	0	0	0	0	3	0	0
NORTHBOUND	87	657	28	100	100	100	1	2	0	685
SOUTHBOUND	481	738	0	0	48	0	2	2	0	351

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.992	3416
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.825	1.000	1421
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.994	1.000	5138

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NB  LT        1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.920 3170
NB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3446
SB  LT        1800  1 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.514  886
SB  TH-RT     1800  2 0.967 0.990 1.000 1.000 1.000 1.000 0.992 1.000 3418

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
SB 100  17  1   87  685   87 1.00  2  351 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm    Flt
SB 3600 0.097  8.551 0.656 1.000  8.911 0.000  0.000    1.716 0.514 0.514

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH     526 3416 0.15 0.22  744 0.71
EB  RT        754 1421 0.53 0.41  583 1.29     *
WB  TH-RT    2013 5138 0.39 0.33 1671 1.21     *
NB  LT        505 3170 0.14 0.19  679 0.71
NB  TH        775 3446 0.22 0.37 1265 0.61
SB  LT         87  886 0.10 0.17  155 0.56
SB  TH-RT     719 3418 0.21 0.17  597 1.21     *

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 1.13 TOTAL V/C= 1.21
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  0 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1     c      d2    PF   Delay LOS Avg Q  95% Q
EB  LT-TH    0.71 0.22 100.0  27.49  744    2.16 0.67   19.93  C  10.9    11
EB  RT       1.29 0.41 100.0  28.15  583  185.66 0.85  182.65  F  44.4   116
WB  TH-RT    1.21 0.33 100.0  28.46 1671  109.68 0.85  117.42  F  76.8   180
NB  LT       0.71 0.37 100.0  20.56  679    2.36 1.00   22.92  C  10.8    11
NB  TH       0.61 0.37 100.0  19.63 1265    0.64 0.63   12.69  B  13.0    13
SB  LT       0.56 0.17 100.0  28.71  155    3.40 0.85   27.29  D   2.0     3
SB  TH-RT    1.21 0.17 100.0  32.79  597  120.03 0.85  129.90  F  32.6    75

DIR Delay LOS
EB 115.76  F
WB 117.42  F
NB  16.73  C
SB 118.81  F
INTERSECTION DELAY = 93.29 INTERSECTION LOS=F

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

THE V/C RATIO CAN'T BE .95 FOR THE GIVEN CONDITIONS
THE EXISTING TIMING IS OPTIMAL
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
MASTER PLAN DESIGN (W/O TREMONT ACCESS - MITIGATED) - SAT PEAK HOUR
date:08-22-1989 time:16:24:55
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2MPNS GEOMETRICS=P18I2M3 SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	13	134	391	0	2	1	0.0	11.0	11.0	44
WB	0	984	118	0	3	0	0.0	11.0	0.0	49
NB	330	880	0	2	2	0	11.0	11.0	0.0	56
SB	92	576	35	1	2	0	11.0	11.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	25	N	16.3	4
WB	0.0%	2.0%	N	0	0	.950	25	N	16.3	3
NB	0.0%	2.0%	N	0	0	.950	25	N	15.0	4
SB	0.0%	2.0%	N	0	0	.950	25	N	15.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							21.9	0	A
2				*				*	*	*			*	*	*		25.4	3	A
3						*	*					*				*	32.3	3	A
4	*	*	*									*				*	11.4	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	13	134	391	.950	14	141	412
WB	0	984	118	.950	0	1036	124
NB	330	880	0	.950	347	926	0
SB	92	576	35	.950	97	606	37

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	155	2	1.05	162	0.09	0.00
EB	RT	412	1	1.00	412	0.00	1.00
WB	TH-RT	1160	3	1.10	1276	0.00	0.11
NB	LT	347	2	1.05	365	1.00	0.00
NB	TH	926	2	1.05	973	0.00	0.00
SB	LT	97	1	1.00	97	1.00	0.00
SB	TH-RT	643	2	1.05	675	0.00	0.06

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	1036	124	0	0	0	0	3	0	0
NORTHBOUND	97	606	37	100	100	100	1	2	0	643
SOUTHBOUND	347	926	0	0	54	0	2	2	0	498

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.986	3396
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.846	1.000	1457
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.983	1.000	5079

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NB  LT        1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.920 3170
NB  TH        1800  2 0.967 0.990 1.000 1.000 1.000 1.000 1.000 1.000 3446
SB  LT        1800  1 0.967 0.990 1.000 1.000 1.000 1.000 1.000 0.423  728
SB  TH-RT     1800  2 0.967 0.990 1.000 1.000 1.000 1.000 0.991 1.000 3414

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT
INPUT VARIABLES
DIR  C   G  N   Va   Vm  Vlt  Plt No   Vo Plto
SB 100  25  1   97  643   97 1.00  2  498 0.00
CALCULATIONS
DIR Sop    Yo     Gu    Fs    Pl     Gq    Pt     Gf       El    Fm   Flt
SB 3600 0.138 13.459 0.564 1.000 11.966 0.000  0.000    1.995 0.423 0.423

CAPACITY ANALYSIS WORKSHEET
DIR LN GROUP    v    s  v/s  g/C    c  v/c  CRITICAL
EB  LT-TH     162 3396 0.05 0.11  387 0.42
EB  RT        412 1457 0.28 0.33  485 0.85      *
WB  TH-RT    1276 5079 0.25 0.32 1640 0.78      *
NB  LT        365 3170 0.09 0.22  829 0.42
NB  TH        973 3446 0.28 0.47 1630 0.60
SB  LT         97  728 0.13 0.25  185 0.52
SB  TH-RT     675 3414 0.20 0.25  868 0.78      *

CYCLE=100.0  LOST= 6.0  SUM V/S CRIT= 0.73 TOTAL V/C= 0.78
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C
 RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
 69 LEFT TURNS ON THE CHANGE INTERVAL AND  67 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET
DIR LN GROUP  v/c  g/C   C     d1     c      d2   PF   Delay LOS Avg Q  95% Q
EB  LT-TH    0.42 0.11 100.0  31.33  387    0.45 0.62   19.70  C   3.8    4
EB  RT       0.85 0.33 100.0  23.57  485    9.26 0.73   23.94  C   7.6    9
WB  TH-RT    0.78 0.32 100.0  23.26 1640    1.73 0.85   21.24  C  21.8   22
NB  LT       0.42 0.47 100.0  13.15  829    0.21 1.00   13.36  B   7.5    8
NB  TH       0.60 0.47 100.0  14.70 1630    0.44 0.62    9.39  B  13.6   14
SB  LT       0.52 0.25 100.0  24.37  185    2.14 0.85   22.54  C   2.0    3
SB  TH-RT    0.78 0.25 100.0  26.34  868    3.17 0.85   25.08  D  13.3   14

DIR Delay LOS
EB  22.74  C
WB  21.24  C
NB  10.47  B
SB  24.76  C
INTERSECTION DELAY = 18.51 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF  50  TO  120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE  26.1 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is  21.9 secs green,   0.0 secs yellow + red clear
suggested timing phase 2 is  25.4 secs green,   3.0 secs yellow + red clear
suggested timing phase 3 is  32.3 secs green,   3.0 secs yellow + red clear
suggested timing phase 4 is  11.4 secs green,   3.0 secs yellow + red clear
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CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
MASTER PLAN DESIGN (W/TREMONT RGT IN/OUT - MITIGATED) - AM PEAK HOUR
date:08-25-1989 time:18:00:48
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2MPRAM GEOMETRICS=P18I2M3 SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	9	114	194	0	2	1	0.0	11.0	11.0	44
WB	0	1653	68	0	3	0	0.0	11.0	0.0	49
NB	725	923	0	2	2	0	11.0	11.0	0.0	56
SB	62	503	16	1	2	0	11.0	11.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	100	N	16.3	4
WB	0.0%	2.0%	N	0	0	.950	50	N	16.3	3
NB	0.0%	2.0%	N	0	0	.950	100	N	15.0	4
SB	0.0%	2.0%	N	0	0	.950	100	N	15.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							23.8	0	A
2				*				*	*	*			*	*	*		18.9	3	A
3						*	*					*				*	43.8	3	A
4	*	*	*									*				*	4.5	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	9	114	194	.950	9	120	204
WB	0	1653	68	.950	0	1740	72
NB	725	923	0	.950	763	972	0
SB	62	503	16	.950	65	529	17

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	129	2	1.05	136	0.07	0.00
EB	RT	204	1	1.00	204	0.00	1.00
WB	TH-RT	1812	3	1.10	1993	0.00	0.04
NB	LT	763	2	1.05	801	1.00	0.00
NB	TH	972	2	1.05	1020	0.00	0.00
SB	LT	65	1	1.00	65	1.00	0.00
SB	TH-RT	546	2	1.05	574	0.00	0.03

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	1740	72	0	0	0	0	3	0	0
NORTHBOUND	65	529	17	100	100	100	1	2	0	546
SOUTHBOUND	763	972	0	0	44	0	2	2	0	429

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.986	3396
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.842	1.000	1451
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.992	1.000	5128
NB	LT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.920	3170
NB	TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3446
SB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.437	754
SB	TH-RT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	0.994	1.000	3425

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
SB	100	19	1	65	546	65	1.00	2	429	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
SB	3600	0.119	7.888	0.607	1.000	10.981	0.000	0.000	1.854	0.437	0.437

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH	136	3396	0.04	0.05	153	0.89	*
EB	RT	204	1451	0.14	0.28	412	0.50	
WB	TH-RT	1993	5128	0.39	0.44	2245	0.89	*
NB	LT	801	3170	0.21	0.24	860	0.89	*
NB	TH	1020	3446	0.30	0.43	1472	0.69	
SB	LT	65	754	0.09	0.19	142	0.46	
SB	TH-RT	574	3425	0.17	0.19	646	0.89	*

CYCLE=100.0 LOST= 9.0 SUM V/S CRIT= 0.81 TOTAL V/C= 0.89
FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR
69 LEFT TURNS ON THE CHANGE INTERVAL AND 36 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH	0.89	0.05	100.0	36.10	153	28.95	0.74	48.34	E	3.5	6
EB	RT	0.50	0.28	100.0	22.70	412	0.80	0.62	14.57	B	4.1	4
WB	TH-RT	0.89	0.44	100.0	19.65	2245	3.45	0.85	19.64	C	28.3	31
NB	LT	0.89	0.43	100.0	20.07	860	7.90	1.00	27.97	D	16.1	19
NB	TH	0.69	0.43	100.0	17.71	1472	1.00	0.67	12.46	B	15.5	15
SB	LT	0.46	0.19	100.0	27.38	142	1.67	0.85	24.69	C	1.5	2
SB	TH-RT	0.89	0.19	100.0	30.05	646	10.05	0.85	34.08	D	12.3	16

DIR	Delay	LOS
EB	28.06	D
WB	19.64	C
NB	19.28	C
SB	33.12	D

INTERSECTION DELAY = 21.90 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 60.1 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 23.8 secs green, 0.0 secs yellow + red clear
suggested timing phase 2 is 18.9 secs green, 3.0 secs yellow + red clear
suggested timing phase 3 is 43.8 secs green, 3.0 secs yellow + red clear
suggested timing phase 4 is 4.5 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
MASTER PLAN DESIGN (W/TREMONT RGT IN/OUT - MITIGATED) - PM PEAK HOUR
date:08-25-1989 time:18:17:15
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2MPRPM GEOMETRICS=P18I2M3 SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	20	446	423	0	2	1	0.0	11.0	11.0	44
WB	0	1650	51	0	3	0	0.0	11.0	0.0	49
NB	447	686	0	2	2	0	11.0	11.0	0.0	56
SB	81	613	24	1	2	0	11.0	11.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.930	100	N	16.3	4
WB	0.0%	2.0%	N	0	0	.930	50	N	16.3	3
NB	0.0%	2.0%	N	0	0	.930	100	N	15.0	4
SB	0.0%	2.0%	N	0	0	.930	100	N	15.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							13.3	0	A
2				*				*	*	*			*	*	*		21.4	3	A
3						*	*					*				*	39.9	3	A
4	*	*	*									*				*	16.3	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	20	446	423	.930	22	480	455
WB	0	1650	51	.930	0	1774	55
NB	447	686	0	.930	481	738	0
SB	81	613	24	.930	87	659	26

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	501	2	1.05	526	0.04	0.00
EB	RT	455	1	1.00	455	0.00	1.00
WB	TH-RT	1829	3	1.10	2012	0.00	0.03
NB	LT	481	2	1.05	505	1.00	0.00
NB	TH	738	2	1.05	775	0.00	0.00
SB	LT	87	1	1.00	87	1.00	0.00
SB	TH-RT	685	2	1.05	719	0.00	0.04

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	1774	55	0	0	0	0	3	0	0
NORTHBOUND	87	659	26	100	100	100	1	2	0	685
SOUTHBOUND	481	738	0	0	62	0	2	2	0	455

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.992	3416
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.824	1.000	1419
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.994	1.000	5138
NB	LT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.920	3170
NB	TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3446
SB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.433	746
SB	TH-RT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	0.993	1.000	3420

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
SB	100	21	1	87	685	87	1.00	2	455	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
SB	3600	0.127	10.067	0.590	1.000	11.376	0.000	0.000	1.906	0.433	0.433

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH	526	3416	0.15	0.16	558	0.94	
EB	RT	455	1419	0.32	0.30	420	1.08	*
WB	TH-RT	2012	5138	0.39	0.40	2052	0.98	*
NB	LT	505	3170	0.13	0.13	511	0.94	
NB	TH	775	3446	0.22	0.35	1197	0.65	
SB	LT	87	746	0.12	0.21	160	0.54	
SB	TH-RT	719	3420	0.21	0.21	733	0.98	*

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.92 TOTAL V/C= 0.98

FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR 69 LEFT TURNS ON THE CHANGE INTERVAL AND 20 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH	0.94	0.16	100.0	31.44	558	18.02	0.76	37.67	D	11.6	17
EB	RT	1.08	0.30	100.0	27.70	420	60.98	0.80	71.21	F	13.4	28
WB	TH-RT	0.98	0.40	100.0	22.53	2052	11.68	0.85	29.08	D	30.5	45
NB	LT	0.94	0.35	100.0	24.05	511	18.83	1.00	42.87	E	11.6	18
NB	TH	0.65	0.35	100.0	20.88	1197	0.87	0.64	14.00	B	13.4	13
SB	LT	0.54	0.21	100.0	26.55	160	2.89	0.85	25.02	D	1.9	3
SB	TH-RT	0.98	0.21	100.0	29.69	733	21.32	0.85	43.36	E	15.7	26

DIR	Delay	LOS
EB	53.22	E
WB	29.08	D
NB	25.39	D
SB	41.38	E

INTERSECTION DELAY = 34.77 INTERSECTION LOS=D

:

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 206.6 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 13.3 secs green, 0.0 secs yellow + red clear
suggested timing phase 2 is 21.4 secs green, 3.0 secs yellow + red clear
suggested timing phase 3 is 39.9 secs green, 3.0 secs yellow + red clear
suggested timing phase 4 is 16.4 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
MASTER PLAN DESIGN (W/TREMONT RGT IN/OUT - MITIGATED) - SAT PEAK HOUR
date:08-25-1989 time:18:08:41
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2MPRS GEOMETRICS=P18I2M3 SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	13	134	269	0	2	1	0.0	11.0	11.0	44
WB	0	984	118	0	3	0	0.0	11.0	0.0	49
NB	330	880	0	2	2	0	11.0	11.0	0.0	56
SB	92	578	33	1	2	0	11.0	11.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	100	N	16.3	4
WB	0.0%	2.0%	N	0	0	.950	50	N	16.3	3
NB	0.0%	2.0%	N	0	0	.950	100	N	15.0	4
SB	0.0%	2.0%	N	0	0	.950	100	N	15.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							16.3	0	A
2				*				*	*	*			*	*	*		28.8	3	A
3						*	*					*				*	36.6	3	A
4	*	*	*									*				*	9.3	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	13	134	269	.950	14	141	283
WB	0	984	118	.950	0	1036	124
NB	330	880	0	.950	347	926	0
SB	92	578	33	.950	97	608	35

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	155	2	1.05	162	0.09	0.00
EB	RT	283	1	1.00	283	0.00	1.00
WB	TH-RT	1160	3	1.10	1276	0.00	0.11
NB	LT	347	2	1.05	365	1.00	0.00
NB	TH	926	2	1.05	973	0.00	0.00
SB	LT	97	1	1.00	97	1.00	0.00
SB	TH-RT	643	2	1.05	675	0.00	0.05

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	1036	124	0	0	0	0	3	0	0
NORTHBOUND	97	608	35	100	100	100	1	2	0	643
SOUTHBOUND	347	926	0	0	64	0	2	2	0	592

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.983	3385
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.833	1.000	1434
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.979	1.000	5059
NB	LT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.920	3170
NB	TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3446
SB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.369	636
SB	TH-RT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	0.989	1.000	3409

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
SB	100	29	1	97	643	97	1.00	2	592	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
SB	3600	0.164	14.761	0.505	1.000	14.011	0.000	0.000	2.227	0.369	0.369

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH	162	3385	0.05	0.09	316	0.51	
EB	RT	283	1434	0.20	0.26	367	0.77	*
WB	TH-RT	1276	5059	0.25	0.37	1853	0.69	*
NB	LT	365	3170	0.08	0.16	681	0.51	
NB	TH	973	3446	0.28	0.45	1552	0.63	
SB	LT	97	636	0.15	0.29	183	0.53	
SB	TH-RT	675	3409	0.20	0.29	981	0.69	*

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.65 TOTAL V/C= 0.69

FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR 69 LEFT TURNS ON THE CHANGE INTERVAL AND 96 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH	0.51	0.09	100.0	32.81	316	1.20	0.62	21.09	C	3.9	4
EB	RT	0.77	0.26	100.0	26.21	367	6.64	0.70	22.97	C	5.9	6
WB	TH-RT	0.69	0.37	100.0	20.40	1853	0.77	0.85	18.00	C	20.4	20
NB	LT	0.51	0.45	100.0	14.90	681	0.55	1.00	15.45	C	8.1	8
NB	TH	0.63	0.45	100.0	15.99	1552	0.58	0.63	10.50	B	14.1	14
SB	LT	0.53	0.29	100.0	22.74	183	2.26	0.85	21.25	C	1.9	2
SB	TH-RT	0.69	0.29	100.0	24.04	981	1.44	0.85	21.65	C	12.7	13

DIR	Delay	LOS
EB	22.29	C
WB	18.00	C
NB	11.85	B
SB	21.60	C

INTERSECTION DELAY = 17.08 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 100 TO 50 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 18.9 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 16.2 secs green, 0.0 secs yellow + red clear
suggested timing phase 2 is 28.8 secs green, 3.0 secs yellow + red clear
suggested timing phase 3 is 36.6 secs green, 3.0 secs yellow + red clear
suggested timing phase 4 is 9.4 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
MASTER PLAN DESIGN (W/TREMONT ACCESS - MITIGATED) - AM PEAK HOUR
date:08-25-1989 time:17:40:08
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2MPTAM GEOMETRICS=P18I2M3 SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	9	114	194	0	2	1	0.0	11.0	11.0	44
WB	0	1653	68	0	3	0	0.0	11.0	0.0	49
NB	525	923	0	2	2	0	11.0	11.0	0.0	56
SB	62	503	15	1	2	0	11.0	11.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	100	N	16.3	4
WB	0.0%	2.0%	N	0	0	.950	50	N	16.3	3
NB	0.0%	2.0%	N	0	0	.950	100	N	15.0	4
SB	0.0%	2.0%	N	0	0	.950	100	N	15.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							17.7	0	A
2				*				*	*	*			*	*	*		20.6	3	A
3						*	*					*				*	47.8	3	A
4	*	*	*									*				*	4.9	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	9	114	194	.950	9	120	204
WB	0	1653	68	.950	0	1740	72
NB	525	923	0	.950	553	972	0
SB	62	503	15	.950	65	529	16

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	129	2	1.05	136	0.07	0.00
EB	RT	204	1	1.00	204	0.00	1.00
WB	TH-RT	1812	3	1.10	1993	0.00	0.04
NB	LT	553	2	1.05	580	1.00	0.00
NB	TH	972	2	1.05	1020	0.00	0.00
SB	LT	65	1	1.00	65	1.00	0.00
SB	TH-RT	545	2	1.05	573	0.00	0.03

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	1740	72	0	0	0	0	3	0	0
NORTHBOUND	65	529	16	100	100	100	1	2	0	545
SOUTHBOUND	553	972	0	0	54	0	2	2	0	522

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.986	3396
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.840	1.000	1447
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.992	1.000	5128
NB	LT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.920	3170
NB	TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3446
SB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.363	625
SB	TH-RT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	0.994	1.000	3426

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
SB	100	21	1	65	545	65	1.00	2	522	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
SB	3600	0.145	7.087	0.549	1.000	13.473	0.000	0.000	2.050	0.363	0.363

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH	136	3396	0.04	0.05	167	0.81	*
EB	RT	204	1447	0.14	0.23	327	0.62	
WB	TH-RT	1993	5128	0.39	0.48	2452	0.81	*
NB	LT	580	3170	0.14	0.18	682	0.81	*
NB	TH	1020	3446	0.30	0.38	1318	0.77	
SB	LT	65	625	0.10	0.21	128	0.51	
SB	TH-RT	573	3426	0.17	0.21	704	0.81	*

CYCLE=100.0 LOST= 9.0 SUM V/S CRIT= 0.74 TOTAL V/C= 0.81

FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR 69 LEFT TURNS ON THE CHANGE INTERVAL AND 52 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH	0.81	0.05	100.0	35.78	167	16.99	0.72	37.77	D	3.4	5
EB	RT	0.62	0.23	100.0	26.49	327	2.60	0.63	18.38	C	4.4	4
WB	TH-RT	0.81	0.48	100.0	16.93	2452	1.56	0.85	15.72	C	26.3	26
NB	LT	0.81	0.38	100.0	20.99	682	5.07	1.00	26.06	D	12.6	13
NB	TH	0.77	0.38	100.0	20.57	1318	2.06	0.70	15.85	C	16.7	17
SB	LT	0.51	0.21	100.0	26.78	128	2.70	0.85	25.06	D	1.4	2
SB	TH-RT	0.81	0.21	100.0	28.79	704	5.04	0.85	28.76	D	12.0	14

DIR	Delay	LOS
EB	26.13	D
WB	15.72	C
NB	19.55	C
SB	28.38	D

INTERSECTION DELAY = 19.60 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 40.6 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 17.7 secs green, 0.0 secs yellow + red clear
suggested timing phase 2 is 20.6 secs green, 3.0 secs yellow + red clear
suggested timing phase 3 is 47.8 secs green, 3.0 secs yellow + red clear
suggested timing phase 4 is 4.9 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
MASTER PLAN DESIGN (W/TREMONT ACCESS - MITIGATED) - PM PEAK HOUR
date:08-25-1989 time:17:45:13
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2MPTPM GEOMETRICS=P18I2M3 SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	20	446	423	0	2	1	0.0	11.0	11.0	44
WB	0	1650	51	0	3	0	0.0	11.0	0.0	49
NB	360	686	0	2	2	0	11.0	11.0	0.0	56
SB	81	613	24	1	2	0	11.0	11.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.930	100	N	16.3	4
WB	0.0%	2.0%	N	0	0	.930	50	N	16.3	3
NB	0.0%	2.0%	N	0	0	.930	100	N	15.0	4
SB	0.0%	2.0%	N	0	0	.930	100	N	15.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							11.6	0	A
2				*				*	*	*			*	*	*		21.4	3	A
3						*	*					*				*	39.9	3	A
4	*	*	*									*				*	18.1	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	20	446	423	.930	22	480	455
WB	0	1650	51	.930	0	1774	55
NB	360	686	0	.930	387	738	0
SB	81	613	24	.930	87	659	26

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	501	2	1.05	526	0.04	0.00
EB	RT	455	1	1.00	455	0.00	1.00
WB	TH-RT	1829	3	1.10	2012	0.00	0.03
NB	LT	387	2	1.05	406	1.00	0.00
NB	TH	738	2	1.05	775	0.00	0.00
SB	LT	87	1	1.00	87	1.00	0.00
SB	TH-RT	685	2	1.05	719	0.00	0.04

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	1774	55	0	0	0	0	3	0	0
NORTHBOUND	87	659	26	100	100	100	1	2	0	685
SOUTHBOUND	387	738	0	0	65	0	2	2	0	479

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.992	3416
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.821	1.000	1414
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.994	1.000	5138
NB	LT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.920	3170
NB	TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3446
SB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.411	708
SB	TH-RT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	0.993	1.000	3420

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
SB	100	21	1	87	685	87	1.00	2	479	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
SB	3600	0.133	9.375	0.576	1.000	12.045	0.000	0.000	1.953	0.411	0.411

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH	526	3416	0.15	0.18	618	0.85	
EB	RT	455	1414	0.32	0.30	420	1.08	*
WB	TH-RT	2012	5138	0.39	0.40	2050	0.98	*
NB	LT	406	3170	0.10	0.12	457	0.85	
NB	TH	775	3446	0.22	0.33	1138	0.68	
SB	LT	87	708	0.12	0.21	152	0.57	
SB	TH-RT	719	3420	0.21	0.21	733	0.98	*

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.92 TOTAL V/C= 0.98

FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR 69 LEFT TURNS ON THE CHANGE INTERVAL AND 20 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET

DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH	0.85	0.18	100.0	30.14	618	7.72	0.73	27.64	D	11.4	12
EB	RT	1.08	0.30	100.0	27.69	420	61.50	0.80	71.65	F	13.5	28
WB	TH-RT	0.98	0.40	100.0	22.56	2050	11.85	0.85	29.26	D	30.5	46
NB	LT	0.85	0.33	100.0	23.67	457	9.63	1.00	33.29	D	9.5	12
NB	TH	0.68	0.33	100.0	21.99	1138	1.17	0.66	15.28	C	13.7	14
SB	LT	0.57	0.21	100.0	26.75	152	3.77	0.85	25.95	D	1.9	3
SB	TH-RT	0.98	0.21	100.0	29.71	733	21.54	0.85	43.56	E	15.8	26

DIR	Delay	LOS
EB	48.05	E
WB	29.26	D
NB	21.48	C
SB	41.66	E

INTERSECTION DELAY = 33.12 INTERSECTION LOS=D

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 215.0 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 11.6 secs green, 0.0 secs yellow + red clear
suggested timing phase 2 is 21.4 secs green, 3.0 secs yellow + red clear
suggested timing phase 3 is 39.9 secs green, 3.0 secs yellow + red clear
suggested timing phase 4 is 18.2 secs green, 3.0 secs yellow + red clear

CINCH PROGRAM VERSION DATE 4-29-1988
1985 HCM - CHAPTER 9: SIGNALIZED - OPERATIONAL ANALYSIS
TREMONT/MELNEA CASS BOULEVARD
MASTER PLAN DESIGN (W/TREMONT ACCESS - MITIGATED0 - SAT PEAK HOUR
date:08-25-1989 time:17:50:34
LAST DATA SET NAMES LOADED OR SAVED
VOLUME=I2MPTS GEOMETRICS=P18I2M3 SIGNAL=P18I2M
LOCATED IN CBD:N
VOLUME & GEOMETRICS

	VOLUMES			# OF LANES			LANE WIDTH			CROSS
DIR	LT	TH	RT	LT	TH	RT	LT	TH	RT	WALK
EB	13	134	269	0	2	1	0.0	11.0	11.0	44
WB	0	984	118	0	3	0	0.0	11.0	0.0	49
NB	250	880	0	2	2	0	11.0	11.0	0.0	56
SB	92	578	33	1	2	0	11.0	11.0	0.0	49

TRAFFIC & ROADWAY CONDITIONS

			ADJ PARK			PEDESTRIANS				ARR
DIR	GRADE	%HV	Y/N	MOVES	BUSES	PHF	CROSS	BUT	MIN TIME	TYPE
EB	0.0%	2.0%	N	0	0	.950	100	N	16.3	4
WB	0.0%	2.0%	N	0	0	.950	50	N	16.3	3
NB	0.0%	2.0%	N	0	0	.950	100	N	15.0	4
SB	0.0%	2.0%	N	0	0	.950	100	N	15.0	3

PHASINGS

	EASTBOUND				WESTBOUND				NORTHBOUND				SOUTHBOUND				GREEN	Y+R	PRE/ACT
	l	t	r	p	l	t	r	p	l	t	r	p	l	t	r	p			
1			*					*	*	*							14.5	0	A
2				*				*	*	*			*	*	*		28.7	3	A
3						*	*					*				*	36.6	3	A
4	*	*	*									*				*	11.2	3	A

CYCLE= 100.0

VOLUME ADJUSTMENT WORKSHEET
PART 1 (MOVEMENT ADJUSTMENTS)

DIR	LTV	THV	RTV	PHF	LTFR	THFR	RTFR
EB	13	134	269	.950	14	141	283
WB	0	984	118	.950	0	1036	124
NB	250	880	0	.950	263	926	0
SB	92	578	33	.950	97	608	35

PART 2 (LANE GROUP ADJUSTMENTS)

DIR	LN GROUP	FLOW	N	LU	v	Plt	Prt
EB	LT-TH	155	2	1.05	162	0.09	0.00
EB	RT	283	1	1.00	283	0.00	1.00
WB	TH-RT	1160	3	1.10	1276	0.00	0.11
NB	LT	263	2	1.05	276	1.00	0.00
NB	TH	926	2	1.05	973	0.00	0.00
SB	LT	97	1	1.00	97	1.00	0.00
SB	TH-RT	643	2	1.05	675	0.00	0.05

PART 3 (OPPOSING VOLUME ADJUSTMENTS)

LEFT TURN	OPPOSING APPROACH									
BEING OPPOSED	VOLUMES			% OPPOSING LEFT TURN			# LANES			OPPOSING
	LT	TH	RT	LT	TH	RT	LT	TH	RT	VOLUME
EASTBOUND	0	1036	124	0	0	0	0	3	0	0
NORTHBOUND	97	608	35	100	100	100	1	2	0	643
SOUTHBOUND	263	926	0	0	67	0	2	2	0	616

SATURATION FLOW ADJUSTMENT WORKSHEET

DIR	LN GROUP	IDEAL	N	Fwid	Fhv	Fgr	Fpark	Fbus	Farea	Frt	Flt	s
EB	LT-TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.983	3385
EB	RT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	0.829	1.000	1429
WB	TH-RT	1800	3	0.967	0.990	1.000	1.000	1.000	1.000	0.979	1.000	5059
NB	LT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.920	3170
NB	TH	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	1.000	1.000	3446
SB	LT	1800	1	0.967	0.990	1.000	1.000	1.000	1.000	1.000	0.352	606
SB	TH-RT	1800	2	0.967	0.990	1.000	1.000	1.000	1.000	0.989	1.000	3409

SUPPLEMENTAL WORKSHEET FOR LEFT-TURN ADJUSTMENT FACTOR FLT

INPUT VARIABLES

DIR	C	G	N	Va	Vm	Vlt	Plt	No	Vo	Plto
SB	100	29	1	97	643	97	1.00	2	616	0.00

CALCULATIONS

DIR	Sop	Yo	Gu	Fs	Pl	Gq	Pt	Gf	El	Fm	Flt
SB	3600	0.171	14.022	0.490	1.000	14.719	0.000	0.000	2.297	0.352	0.352

CAPACITY ANALYSIS WORKSHEET

DIR	LN GROUP	v	s	v/s	g/C	c	v/c	CRITICAL
EB	LT-TH	162	3385	0.05	0.11	379	0.43	
EB	RT	283	1429	0.20	0.26	367	0.77	*
WB	TH-RT	1276	5059	0.25	0.37	1851	0.69	*
NB	LT	276	3170	0.06	0.14	623	0.42	
NB	TH	973	3446	0.28	0.43	1488	0.65	
SB	LT	97	606	0.16	0.29	174	0.56	
SB	TH-RT	675	3409	0.20	0.29	980	0.69	*

CYCLE=100.0 LOST= 6.0 SUM V/S CRIT= 0.65 TOTAL V/C= 0.69

FOR THE NORTHBOUND PROTECTED/PERMISSIVE LEFT TURN LANE THE CAPACITY, V/S AND V/C RATIOS HAVE ALL BEEN ADJUSTED TO REFLECT A CAPACITY FOR 69 LEFT TURNS ON THE CHANGE INTERVAL AND 96 ON THE PERMISSIVE PHASE

LEVEL OF SERVICE WORKSHEET

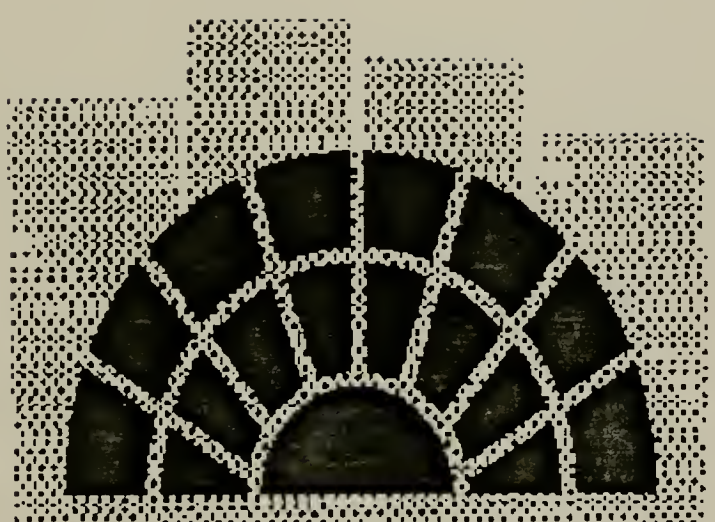
DIR	LN GROUP	v/c	g/C	C	d1	c	d2	PF	Delay	LOS	Avg Q	95% Q
EB	LT-TH	0.43	0.11	100.0	31.47	379	0.49	0.62	19.82	C	3.8	4
EB	RT	0.77	0.26	100.0	26.19	367	6.69	0.70	23.01	C	5.8	6
WB	TH-RT	0.69	0.37	100.0	20.43	1851	0.78	0.85	18.02	C	20.4	20
NB	LT	0.42	0.43	100.0	15.00	623	0.29	1.00	15.28	C	6.3	6
NB	TH	0.65	0.43	100.0	17.08	1488	0.74	0.65	11.53	B	14.6	15
SB	LT	0.56	0.29	100.0	22.96	174	2.91	0.85	21.99	C	1.9	3
SB	TH-RT	0.69	0.29	100.0	24.06	980	1.45	0.85	21.68	C	12.7	13

DIR	Delay	LOS
EB	21.85	C
WB	18.02	C
NB	12.36	B
SB	21.72	C

INTERSECTION DELAY = 17.35 INTERSECTION LOS=C

THE CYCLE LENGTH WITHIN THE BOUNDS OF 50 TO 120 SECONDS
WHICH MINIMIZES CRITICAL MOVEMENT DELAY IS 100.0 SECONDS

FOR A V/C RATIO OF .95 THE CYCLE SHOULD BE 18.9 SECONDS
for chosen cycle length 100.0
suggested timing phase 1 is 14.4 secs green, 0.0 secs yellow + red clear
suggested timing phase 2 is 28.7 secs green, 3.0 secs yellow + red clear
suggested timing phase 3 is 36.6 secs green, 3.0 secs yellow + red clear
suggested timing phase 4 is 11.3 secs green, 3.0 secs yellow + red clear



Appendix G

MBTA Correspondence

APPENDIX G

MBTA CORRESPONDENCE REGARDING TRANSIT CAPACITY

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

Ten Park Plaza, Boston, MA 02116

December 2, 1988

Ms. Jane Howard
Howard/Stein - Hudson Associates
38 Chauncy Street, 7th Floor
Boston, MA 02111

Dear Ms. Howard:

In accordance with our recent telephone conversation, the following descriptions are provided of current and planned (near-term) expansion of Red and Orange Line services.

RED LINE

Current Red Line service has 29 trains scheduled for service, as summarized below:

	4-CAR TRAINS	6-CAR TRAINS	TOTAL TRAINS	AVERAGE HEADWAY
Braintree-Alewife	5	9	14	8 min.
Ashmont-Alewife	7	5	12	8 min.
Run-as-Directed	-	3	3	
	12	17	29	

The three run-as-directed trains are used by Transportation Officials to provide extra service where needed. Generally, each of these trains make one trip in each direction during the peak hour. The 29 trains make one trip in each direction during the peak. The following estimate of peak period ridership on the Red Line was developed from observations of passenger loads at peak load points.

		PEAK PERIOD		PEAK HOUR	
RED LINE					
Between Andrew and JFK	ASHMT	9,000	(4-6PM)	ASHMT 5,400	(5:45-5:45PM)
Between Andrew and No. Quincy	BRNTR	12,250	(4-6PM)	BRNTR 7,350	(4:30-5:30PM)
		21,250		12,750	

The MBTA is currently accepting cars from an order of fifty-eight (58) new cars for the Red Line. To date forty-two (42) cars have been delivered with the remainder due in by early 1989. These new cars will increase the Red Line fleet size to 218 cars, broken down as follows:

86	No. 5 Cambridge-Dorchester
74	No. 1 South Shore
58	No. 2
218	

The MBTA intends to minimize the use of the older, problematic No. 5 Cambridge-Dorchester cars as six-car train units. Delivery of the 58 new No. 2 cars will permit for the 17 six-car trains in the 150 car schedule to be made up exclusively of the new No. 2 cars and the recently rebuilt No. 1 South Shore cars. The No. 5 cars will continue to run in service as four-car trains. Accordingly, it is appropriate that the currently scheduled service should be assumed for the early 1990's.

The MBTA is currently preparing a specification for the No. 3 car which will replace the No. 5 car and possibly further supplement the Red Line fleet. Recognizing that car procurements normally require three to five years, it seems appropriate that no No. 3 cars should be assumed for the early 1990's.

The planning standard for passenger capacity of a Red Line car is 180 passengers based on a fully seated load and 2.5 square feet of available standee space per standee.

ORANGE LINE

Current Orange Line service has eighteen (18) trains scheduled for service, as summarized below:

	4-CAR TRAINS	6-CAR TRAINS	TOTAL TRAINS	AVERAGE HEADWAY
Forest Hills - Oak Grove	4	14	18	4 1/2 min.

All Orange Line trains operate between line terminals. The following estimate of peak period ridership on the Orange Line was developed from observations of passenger loads at peak load points.

	PEAK PERIOD	PEAK HOUR
ORANGE LINE NORTH		
Between Haymarket and North Station	15700 (7-9AM)	9300 (8:00-9:00AM)
	15000 (4-6PM)	8900 (4:45-5:45PM)
ORANGE LINE - SWC		
Between Back Bay and NEMC	14600 (7-9AM)	8800 (7:45-8:45AM)
	12600 (4-6PM)	7650 (4:45-5:45PM)

The Orange Line fleet has 120 Hawker-Siddeley vehicles purchased in 1980. A specification for additional Orange Line cars is being prepared, however, it is expected that delivery would occur after the No. 3 Red Line car procurement. The 102 vehicles required to provide the current schedule is the maximum practical number of vehicles that can be scheduled for service. Accordingly, it is appropriate to assume the current schedule through the early 1990's.

The planning standard for passenger capacity of an Orange Line car is 155 passengers based on a fully seated load and 2.5 square feet of available standee space per standee.

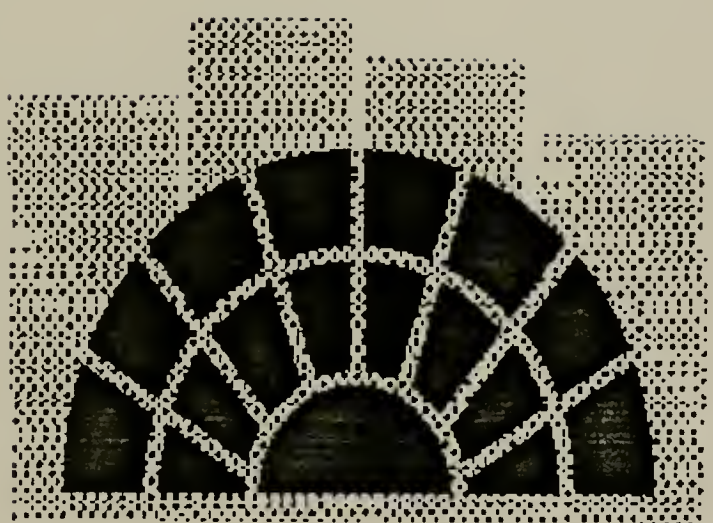
I hope that this information will be helpful.

Very truly yours,

Michael T. Burns

Michael T. Burns
Manger of Operations Planning

MTB/lmr



Appendix H

Pedestrian and Bicycle Counts

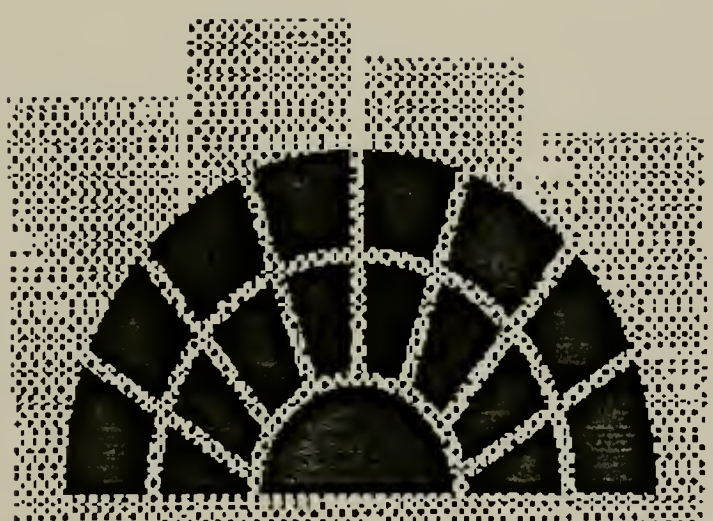
APPENDIX H

RUGGLES CENTER PEDESTRIAN, DROPOFF/PICKUP AND BICYCLE ACTIVITY

- Tremont Street Entrance

RUGGLES CENTER PEDESTRIAN, DROPOFF/PICKUP, AND BICYCLE ACTIVITY
TREMONT STREET ENTRANCE

				AUTOMOBILES				
	TIME	PEDESTRIANS		PICKUP		DROPOFF		BICYCLES
DATE	ENDING	IN	OUT	VEH.	PEOPLE	VEH.	PEOPLE	(Passing by)
8/1/89	7:15AM	9	4	2	2	2	2	6
	7:30AM	12	3	2	4	3	4	8
	7:45AM	24	5	1	4	3	3	4
	8:00AM	37	3	1	4	8	8	6
	8:15AM	31	7	2	4	4	5	5
	8:30AM	31	4	1	2	5	6	6
	8:45AM	18	13	1	1	4	4	6
	9:00AM	23	14	0	0	0	0	10
	Total	185	53	10	21	29	32	51
8/2/89	7:15AM	13	1	1	1	2	2	6
	7:30AM	17	5	2	5	3	3	6
	7:45AM	27	13	2	2	3	3	5
	8:00AM	27	5	2	2	4	4	7
	8:15AM	35	8	2	4	4	4	7
	8:30AM	40	5	2	2	5	5	8
	8:45AM	24	13	1	2	7	7	12
	9:00AM	15	7	1	2	2	2	7
	Total	198	57	13	20	30	30	58
7/27/89	4:15PM	13	20	1	1	1	3	
	4:30PM	11	21	1	1	4	4	
	4:45PM	9	36	2	2	3	4	
	5:00PM	11	33	5	5	2	4	
	5:15PM	8	23	4	6	1	3	
	5:30PM	8	42	7	8	1	4	
	5:45PM	6	42	8	8	2	3	
	6:00PM	5	20	2	3	1	6	
	Total	71	237	30	34	15	31	
8/2/89	4:15PM	8	22	0	0	1	4	9
	4:30PM	9	19	3	3	2	3	6
	4:45PM	9	10	6	6	2	4	12
	5:00PM	4	36	5	5	2	4	7
	5:15PM	10	19	5	7	2	3	7
	5:30PM	7	57	12	13	2	5	11
	5:45PM	4	9	6	9	0	0	8
	6:00PM	0	17	4	4	1	1	15
	Total	51	189	41	47	12	24	75



Appendix I

Trip Rates/Modal Split Calculations

APPENDIX I

PERSON TRIP RATES AND MODAL SPLIT CALCULATIONS FOR MASTER PLAN DESIGN

MODE SPLIT SUMMARY BY ALTERNATIVE
FOR RUGGLES CENTER (PARCEL 18) FEIR
ALTERNATIVE: RUGGLES CENTER - MASTER PLAN DESIGN
UPDATED: 8 AUGUST 1989

OFFICE:

		MODE SPLIT				
		AUTO		TRANSIT	WALK/ OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	4,066	1,870	1,508	1,789	407	4,066
Non-Work	2,188	1,050	611	656	481	2,188
Total	6,254	2,921	2,119	2,445	888	6,254
AM PEAK						
In						
Work	753	346	279	331	75	753
Non-Work	188	90	52	56	41	188
Total In:	941	437	332	388	117	941
Out						
Work	0	0	0	0	0	0
Non-work	142	68	40	43	31	142
Total Out:	142	68	40	43	31	142
Total						
Work	753	346	279	331	75	753
Non-work	330	158	92	99	73	330
Total	1,083	505	371	430	148	1,083
PM PEAK						
In						
Work	56	26	21	25	6	56
Non-work	107	51	30	32	24	107
Total In	163	77	51	57	29	163
Out						
Work	728	335	270	320	73	728
Non-work	127	61	35	38	28	127
Total Out	855	396	306	358	101	855
Total						
Work	784	361	291	345	78	784
Non-work	234	112	65	70	51	234
Total	1,018	473	356	415	130	1,018
SATURDAY TOTAL						
Work	1,104	508	410	486	110	1,104
Non-Work	122	56	34	37	27	122
Total	1,226	566	444	522	137	1,226
SATURDAY PEAK						
In						
Work	61	28	23	27	6	61
Non-work	5	2	1	2	1	5
Total In	66	30	24	28	7	66
Out						
Work	51	23	19	22	5	51
Non-work	5	2	1	2	1	5
Total Out	56	26	20	24	6	56
Total						
Work	112	52	42	49	11	112
Non-work	10	5	3	3	2	10
Total	122	56	44	52	13	122

RETAIL:

		MODE SPLIT				
		AUTO		TRANSIT	WALK/ OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	339	156	126	149	34	339
Non-Work	2,486	1,193	694	557	696	2,486
Total	2,825	1,349	820	746	730	2,825
AM PEAK						
In						
Work	28	13	10	12	3	28
Non-Work	19	9	5	5	5	19
Total In:	47	22	16	17	8	47
Out						
Work	0	0	0	0	0	0
Non-work	20	10	6	5	6	20
Total Out:	20	10	6	5	6	20
Total						
Work	28	13	10	12	3	28
Non-work	39	19	11	9	11	39
Total	67	32	21	22	14	67
PM PEAK						
In						
Work	21	10	8	9	2	21
Non-work	85	41	24	20	24	85
Total In	106	50	32	30	26	106
Out						
Work	24	11	9	11	2	24
Non-work	96	46	27	23	27	96
Total Out	120	57	36	34	29	120
Total						
Work	45	21	17	20	5	45
Non-work	181	87	51	43	51	181
Total	226	108	67	63	55	226
SATURDAY TOTAL						
Work	448	206	166	197	45	448
Non-Work	3,286	1,577	917	789	920	3,286
Total	3,734	1,783	1,083	986	965	3,734
SATURDAY PEAK						
In						
Work	9	4	3	4	1	9
Non-work	172	83	48	41	48	172
Total In	181	87	51	45	49	181
Out						
Work	9	4	3	4	1	9
Non-work	165	79	46	40	46	165
Total Out	174	83	49	44	47	174
Total						
Work	18	8	7	8	2	18
Non-work	337	162	94	81	94	337
Total	355	170	101	89	96	355

HOTEL

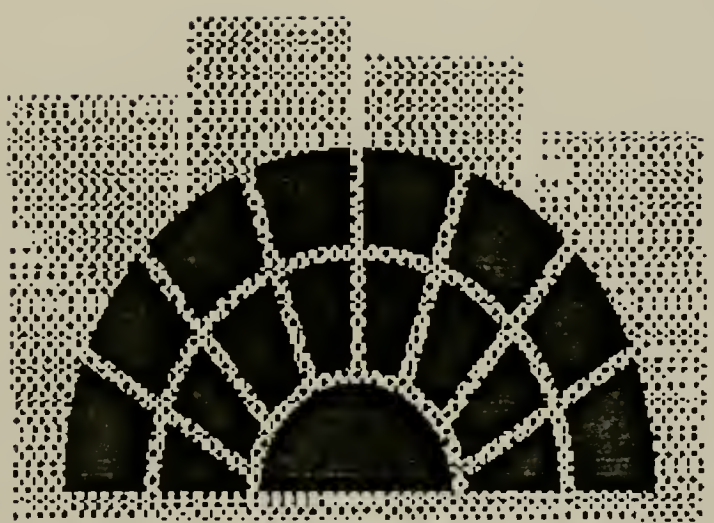
		MODE SPLIT				
		AUTO		TRANSIT	WALK/ OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	507	233	188	223	51	507
Non-Work	2,878	1,698	987	547	633	2,878
Total	3,385	1,931	1,175	770	684	3,385
AM PEAK						
In						
Work	14	6	5	6	1	14
Non-Work	121	71	42	23	27	121
Total In:	135	78	47	29	28	135
Out						
Work	0	0	0	0	0	0
Non-work	70	41	24	13	15	70
Total Out:	70	41	24	13	15	70
Total						
Work	14	6	5	6	1	14
Non-work	191	113	66	36	42	191
Total	205	119	71	42	43	205
PM PEAK						
In						
Work	0	0	0	0	0	0
Non-work	123	73	42	23	27	123
Total In	123	73	42	23	27	123
Out						
Work	8	4	3	4	1	8
Non-work	96	57	33	18	21	96
Total Out	104	60	36	22	22	104
Total						
Work	8	4	3	4	1	8
Non-work	219	129	75	42	48	219
Total	227	133	78	45	49	227
SATURDAY TOTAL						
Work	418	192	155	184	42	418
Non-Work	2,370	1,398	813	450	521	2,370
Total	2,788	1,591	968	634	563	2,788
SATURDAY PEAK						
In						
Work	0	0	0	0	0	0
Non-work	141	83	48	27	31	141
Total In	141	83	48	27	31	141
Out						
Work	8	4	3	4	1	8
Non-work	101	60	35	19	22	101
Total Out	109	63	38	23	23	109
Total						
Work	8	4	3	4	1	8
Non-work	242	143	83	46	53	242
Total	250	146	86	50	54	250

DAYCARE

		MODE SPLIT				
		AUTO		TRANSIT	WALK/ OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	117	54	43	51	12	117
Non-Work	1,051	210	122	315	526	1,051
Total	1,168	264	166	367	537	1,168
AM PEAK						
In						
Work	11	5	4	5	1	11
Non-Work	94	19	11	28	47	94
Total In:	105	24	15	33	48	105
Out						
Work	9	4	3	4	1	9
Non-work	84	17	10	25	42	84
Total Out:	93	21	13	29	43	93
Total						
Work	20	9	7	9	2	20
Non-work	178	36	21	53	89	178
Total	198	45	28	62	91	198
PM PEAK						
In						
Work	10	5	4	4	1	10
Non-work	93	19	11	28	47	93
Total In	103	23	15	32	48	103
Out						
Work	11	5	4	5	1	11
Non-work	100	20	12	30	50	100
Total Out	111	25	16	35	51	111
Total						
Work	21	10	8	9	2	21
Non-work	193	39	22	58	97	193
Total	214	48	30	67	99	214
SATURDAY TOTAL						
Work	83	38	31	37	8	83
Non-Work	28	6	3	8	14	28
Total	111	44	34	45	22	111
SATURDAY PEAK						
In						
Work	14	6	5	6	1	14
Non-work	5	1	1	2	3	5
Total In	19	7	6	8	4	19
Out						
Work	9	4	3	4	1	9
Non-work	3	1	0	1	2	3
Total Out	12	5	4	5	2	12
Total						
Work	23	11	9	10	2	23
Non-work	8	2	1	2	4	8
Total	31	12	9	13	6	31

TOTAL

		MODE SPLIT				
		AUTO		TRANSIT	WALK/ OTHER	
	TOTAL	Persons	Cars			Check
TOTAL ADT:						
Work	5,029	2,313	1,866	2,213	503	5,029
Non-Work	8,603	4,152	2,414	2,115	2,336	8,603
Total	13,632	6,465	4,279	4,328	2,839	13,632
AM PEAK						
In						
Work	806	371	299	355	81	806
Non-Work	422	190	110	112	120	422
Total In:	1,228	560	409	467	201	1,228
Out						
Work	9	4	3	4	1	9
Non-work	316	136	79	86	94	316
Total Out:	325	140	82	90	95	325
Total						
Work	815	375	302	359	82	815
Non-work	738	325	189	198	215	738
Total	1,553	700	492	557	296	1,553
PM PEAK						
In						
Work	87	40	32	38	9	87
Non-work	408	183	107	104	121	408
Total In	495	223	139	142	130	495
Out						
Work	771	355	286	339	77	771
Non-work	419	184	107	109	126	419
Total Out	1,190	538	393	449	203	1,190
Total						
Work	858	395	318	378	86	858
Non-work	827	367	213	213	247	827
Total	1,685	762	532	591	333	1,685
SATURDAY TOTAL						
Work	2,053	944	762	903	205	2,053
Non-Work	5,806	3,040	1,767	1,284	1,482	5,806
Total	7,859	3,984	2,529	2,187	1,688	7,859
SATURDAY PEAK						
In						
Work	84	39	31	37	8	84
Non-work	323	169	98	71	83	323
Total In	407	208	130	108	91	407
Out						
Work	77	35	29	34	8	77
Non-work	274	142	82	61	71	274
Total Out	351	177	111	95	79	351
Total						
Work	161	74	60	71	16	161
Non-work	597	311	181	132	154	597
Total	758	385	241	203	170	758



Appendix J

Boston Traffic Department Memo

APPENDIX J

MEMORANDUM FROM T.J. JAFAR, JUNIOR TRAFFIC ENGINEER AIDE, BOSTON TRANSPORTATION DEPARTMENT TO JIM MCLAUGHLIN, SUP. TRAFFIC ENGINEER, BOSTON TRANSPORTATION DEPARTMENT, REGARDING THE FEASIBILITY OF A SIGNAL INSTALLATION AT THE INTERSECTION OF DAVENPORT AND HAMMOND STREETS WITH TREMONT STREET, DATED JANUARY 19, 1988.

Date: January 19. 1988
To: Jim McLaughlin, Sup. Traffic Engineer, Transporation Dept.
From: T.J. Jafar, Junior Traffic Engineer Aide, Transportation Dept.

Introduction:

The following report investigates the feasibility of a signal instillation at the intersection of Davenport and Hammond Streets with Tremont Street. Traffic signals are not to be installed unless one or more of the signal warrants are met, as prescribed by the Manual on Uniform Devices for Streets and Highways. The following warrants were analyzed in terms of the Data on traffic conditions in the above mentioned intersection on September 8, 1987. The Data covers the hours from 7 a.m. to 6 p.m. It should be noted that for each warrant, a brief description of the criteria is given in the beginning followed by the analyzation of the data for that particular warrant. There is a total of 11 warrants.

Warrant 1, Minimum Vehicular Volume:

The Minimum Vehicular Volume warrant is intended for application where the volume of intersecting traffic is the principal reason for consideration of signal installation. This warrant is satisfied when each of any 8 hours of an average day the traffic volume of the major street (Tremont) is 600 vehicles and the minor street (Hammond) is 150.

-- Only the major street met the volume requirements for all of the 8 hours. The minor street never met the traffic volume requirement. The maximum traffic volume ever reached was 104, which is below 150. Thus the minor streets are not significantly contributing to the traffic volume of the major street. The warrant is disregarded.

Warrant 2,Interruption of Continous Traffic:

The Interruption of Continous Traffic warrant applies to operating conditions where the major street is so heavy that traffic on a minor intersecting street suffers excessive delay or hazard in entering or crossing the major street. This warrant is satisfied when each of any 8 hours of an average day, the traffic volume is 900 vehicles on the major street and 75 on the minor street.

-- Tremont (major street) satisfies this requirement for every hour. The range was from 946 vehicles to 1,511 vehicles. This is not surprising since Tremont is a major city street. Hammond (minor street) met the requirement for only two hours: 79 vehicles at 4 p.m. and 104 at 5 p.m. The third highest count was 59. However it should be noted that these two hours are an exception since they are considered to be "rush hours". The other minor street, Davenport, had a high of 48 vehicles. Thus this warrant is not feasible.

Warrant 3, Minimum Pedestrian Volume:

The Minimum Pedestrian Volume warrant is satisfied when on the major street, 600 or more vehicles per hour enter the intersection (both approaches) and there are 150 or more pedestrians per hour on the major street (highest volume crosswalk).

-- Only the first section of the warrant was met. For the second section, there was a maximum count of 65 pedestrians crossing at 3 p.m. This figure is well under the 150 value given above. This is figure is very important since it indicates that pedestrian crossing is at a minimum. This in turn shows that a traffic signal is useless in this situation due to the lack of a significant amount of pedestrians that would require a traffic light for the coordination of orderly vehicle-pedestrian movement.

Warrant 4, School Crossing:

The School Crossing warrant is needed when frequent and adequate gaps are needed and related to the size of groups of school children crossing the intersection (ie, near a school).

-- This warrant is not pertinent in this situation since this intersection is not in the proximity of a school.

Warrant 5, Progressive Movement:

Progressive movement control sometimes necessitates traffic signal instillations at intersections where they would not otherwise be warranted, in order to maintainn proper gruoping of vehicles. This warrant is satisfied when on a two-way street, adjacent signals do not provide the necessary degree of speed control.

-- The speed of vehicles on Tremont Street are within the prescribed speed control set by the city. Thus this warrant does not apply.

Warrant 6, Accident Experience:

The Accident warrant is satisfied when there exists a volume of vehicular and pedestrian traffic not less than 80 percent of the requirements specified either in the Minimum Volume warrant, the Interruption of Continous warrant, or the Minimum Pedestrian Volume warrant.

-- For the Minimum Vehicular Volume warrant, the minor street value was only 69.33 % (104/150). This was the maximal value of the 8 hours. For the Interruption of Continous warrant, the minor street value met only 2 out of the 8 hours. The third highest value in that category was 59/75, which is 78.66%. For the Minimum Pedestrian Volume warrant, the maximal value for the major street was 65/600 or 9.32% while the minor street had a maximal value of 72/150 or 48.00%. Not one of the above percentages corresponds to a value of 80 percent. This is even taking into account that some of the figures do not satisfy the pre-condition of each of the eight hours.

Warrant 7, Systems Warrant:

A traffic signal instillation at some intersection may be warranted to encourage concentration and organization of traffic flow networks. This warrant is applicable when the common intersection of two or more major routes has a total existing, or immediately projected entering volume of at least 800 vehicles during the peak hour of a typical weekday, or each of any five hours of a Saturday and/or Sunday.

-- This warrant is not applicable

Warrant 8, Combination of Warrants:

In exceptional cases, signals occasionally may be justified where no single warrant is satisfied but where two or more of Warrants 1,2, and 3 are satisfied to the extent of 80 percent or more of the stated values.

-- This warrant is not applicable since none of the warrants are valid to begin with. Thus a combination itself is not possible.

Warrant 9, Four-hour Volumes:

This warrant is satisfied when, for each of any four hours of an average day, the plotted points representing the vehicles per hour on the major streets (both approaches) and the corresponding vehicles per hour on the higher volume minor street approach all fall above the appropriate curve.

-- None of the plotted points (from the traffic data) fall above or on the curve. Thus this warrant is void.

Warrant 10, Peak-hour Delay:

This warrant is intended for locations where traffic conditions are such that, for one hour of the day, minor street traffic suffers undue delay in entering or crossing the main street. This is satisfied when the volume on the side street approach equals or exceeds 150 vph for two moving lanes and the total entering volume serviced during this hour excedes 800 vph for intersections with four or more approaches.

-- Both sections are not satisfied for this warrant. The volume on the side street during peak-hour (maximal value) is 104 vehicles per hour (below the 150 value). The vehicle serviced during this hour does not exceed 800. Thus this warrant is not applicable.

Warrant 11, Peak-hour Volume:

Intended for the same condition as Warrant 10, Peak-hour Delay. This warrant is satisfied when the plotted point representing the vehicles per hour on the major street (both approaches) and the corresponding vehicles per hour on the higher-value minor street approach (one direction) for one hour on an average weekday falls above the proper curve.

-- The plotted points for the peak hour (or any hour) does not fall on or above the given curve. Thus this warrant is not applicable.

Notes:
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1. An average day is defined as a week day representing traffic volumes normally and repeatedly found at locations.

2. When the data was comapared, the higher value minor street (Hammond) was chosen over the smaller value minor street (Davenport).

Conclusion:

It is in the opinion of the department, after careful analyzation of the traffic data and considering the possibilities of the situation, it does not recommend the instillation of a traffic signal at the intersection of Davenport and Hammond Streets with Tremont Street. None of the above warrants and their criteria was satisfied for the traffic data. Thus the instillation of a traffic signal would cause more harm then good at this intersection.

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